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Foundrymen's Meeting in Toronto

Large Attendance and Strong Papers and
Discussions Feature Convention, August
20-23. Report of Non-Ferrous Sessions

THE Toronto meeting of the American Foundrymen's Association was one of the most successful in recent years. Even without the attraction of exhibits, over 600 members and visitors registered, and over 150 ladies. The meetings were fully attended and the discussions warm.

A tragic occurrence cast a pall over the meeting.

B. H. Johnson, assistant to the president, R. D. Wood Company, Philadelphia, and recently re-elected vice president of the American Foundrymen's Association, died in Toronto, August 27, of pneumonia. Mr. Johnson was one of the organizers of the Gray Iron Institute, now the Gray Iron Founders' Society and was active in the work of that association, serving as president for one year. He was also an active member of the Philadelphia Foundrymen's Association which recently became the Philadelphia Metropolitan chapter of the A. F. A. He also took an active interest in the Metal Manufacturers' Association of Philadelphia.

Funeral services will be held at Swampscott, Mass. on Thursday, August 29.

Foundry Cost Committee, Wednesday August 21

An open meeting of the Cost Committee of the American Foundrymen's Association under the chairmanship of Sam Tour of Lucius Pitkin, Inc., was attended by approximately thirty foundrymen interested in costs. Large charts had been prepared by the committee illustrating the standard cost systems of the Non-Ferrous Foundry Industry, the Grey Iron Foundry Industry and the Malleable Iron Foundry

Industry. These charts showed quite plainly that the fundamental principles of these three cost systems were the same. Discussion brought out the need for further work along the line of showing the basic similarities of these systems and the great advantages to be obtained by a uniform adoption and use in industry of these systems. Plans were made for the enlargement of the AFA cost committee and the carrying on of further work along the lines indicated by the discussion.

Third Annual Conference on Deoxidation and Degassing of Non-Ferrous Metals, Thursday, August 22

The third annual conference of the Non-Ferrous Division of the American Foundrymen's Association on the above subject was called to order by Jerome Strauss of the Vanadium Corporation of America, who pointed out that this was a continuation of similar conferences held in previous years.

The first paper was presented by R. J. Keeley of the Ajax Metal Company and was entitled "Deoxidation and Degassing of Nickel-Silvers." After briefly describing the nature of nickel-silver alloys, the author gave six specific examples of difficulties encountered in the production of castings from certain of these alloys and the steps taken to successfully overcome the troubles in each case. The author finally summarized his experience by recommending that for pressure tight castings in alloys containing under 3% lead an addition of .25% of silicon should be made in the form of 10% silicon copper, while for

pressure tight castings with alloy containing over 3% of lead, silicon should not be used but there should be added approximately .10% of manganese in the form of 30% manganese copper and approximately .05% of metallic magnesium. The author further recommended that for alloys containing less than 6% of zinc superheating of the metal prior to the addition of these degasifying and deoxidizing agents is desirable. For castings not intended to be pressure tight the author recommended the addition of aluminum. The amount of aluminum to be added to be



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held as low as possible for castings of varied cross section and up to 3% to be added for castings of uniform cross section, and dependent upon strength requirements.

In discussing the paper, **T. E. Kihlgren** of the International Nickel Company called attention to the coarsening effect of silicon on nickel silver alloys containing 5% of lead and showed by means of slides how silicon gave defective castings, while satisfactory castings were obtained if the metal was treated with .10% of manganese, .05% of magnesium and .02% of phosphorus. He further brought out that in making silicon additions that the effect of silicon in coarsening the grain increased directly as the quantity silicon added increased. He further brought out that he was therefore not in agreement with the author on silicon additions to nickel silver alloys containing less than 3% of lead, as here again the silicon has a tendency to coarsen the grain, cause leakage under hydraulic tests and cause a certain amount of hot shortness. Here again, Mr. Kihlgren reported finding that the use of the manganese plus magnesium plus phosphorus was the best practice, with a caution that excessive manganese should be avoided. In one of the examples described by Mr. Keeley a defect was attributed to sulphur contained in the coke used in the coke fired pit furnace and here Mr. Kihlgren questioned whether the difficulties were really due to sulphur as they had made experiments wherein they had intentionally added .02% of sulphur to the alloy without causing the troubles described. Mr. Kihlgren also questioned the use of .5% aluminum in alloys of this type.

Sam Tour of Lucius Pitkin, Inc., in discussing the conclusions reached by the author regarding the effect of adding silicon in one of his examples, took exception to the statement by the author that the simple addition of a small amount of silicon of the order of .25% materially increased the shrinkage of

the alloy, and pointed out that gassed alloys of this type do not show their normal shrinkage. If they are degassed, whether by the use of silicon or by the use of some other degasifier they will show their normal shrinkage. The increase in shrinkage then cannot be ascribed directly to the addition of silicon but should be credited to the removal of gas. Had the gas not been present, full shrinkage would be obtained without the addition of any special element.

G. H. Clamer, of the Ajax Metal Company, in further discussing the question of sulphur called attention to the possibility that sulphur from coke might be expected to enter the metal as sulphur dioxide which might have a different effect than sulphur entering the metal in some other form.

W. Romanoff of H. Kramer & Company questioned the form in which the sulphur was present in the coke. Mr. Romanoff also advised that he would be fearful that the silicon additions might cause difficulty in machining.

Further discussion brought out that one firm had developed a special manganese boron alloy for use in this type of alloy and had found that it was quite satisfactory for metal melted in a somewhat oxidizing atmosphere but did not work out so well on metal melted in reducing atmospheres.

In replying to the various discussions, Mr. Keeley advised that they were experimenting further on the question of sulphur in coke, that they had had a very considerable experience with the use of aluminum in this type of alloy and had not found it detrimental, and that experience had shown them that the addition of silicon to the alloys containing not over 3% of lead regularly removed sluggishness and increased the shrinkage of the alloy.

The second paper was presented by **C. H. Lorig** of Battelle Memorial Institute and was entitled "The 'Modifying' Phenomenon and Its Probable Relation to Properties of Non-Ferrous Alloys." In this paper the authors present the "slag-cloud" hypothesis as a possible explanation of the grain structure resulting upon the cooling of non-ferrous metals from the liquid to the solid state when they have present in them in the liquid state either sub-microscopic particles of solid matter or sub-microscopic gas bubbles. The hypothesis presumes that such minute inclusions act as nuclei for crystallization and thus prevent under cooling and promote normal freezing. With the further assumption that normal freezing results in coarse grain, coring and the formation of large dendrites, and that under cooling leads to fine grained or modified structure, the authors describe how various final structures obtained may be accounted for. The assumption that sub-microscopic gas bubbles as well as sub-microscopic solid particles may function as centers for crystallization, merely enlarges upon the original "slag-cloud" hypothesis. The authors further recognize that some of these particles may be of different degrees of effectiveness and thus some may cause the metal to solidify normally while others may be innocuous and permit the metal to under cool. Neither large particles nor those of atomic dimensions will conceivably act as effective centers for crystallization and that therefore there must exist some critical particle size from which any departure leads to diminishing effects. The resultant effect of superheating and of adding certain deoxidizers and degasifiers to molten alloys may lead either to the destruction of crystal centers or to the creation of new centers, and thus result in wide variations in the properties of the finished alloy.

In discussing the above paper, Dr. O. W. Ellis of the Ontario Research Foundation of Toronto stated that in his opinion this hypothesis was worthy of attention but required a great deal of work. One must visualize a molten alloy through which a cloud of non-metallics is distributed. If the temperature is raised the cloud should, or might disappear, and on cooling these particles might reappear or might be prevented from reappearing. If cooled slowly they may appear while if cooled fast enough they may not. Laboratory experiments should be carried out along these lines, as much difference of opinion has developed as to the effect of superheating on cast iron. Dr. Ellis further stated that he would much prefer to call this the "sonim" cloud instead of the "slag" cloud hypothesis, and that in considering it one should consider the question of reappearance of the cloud on cooling.

G. H. Clamer of the Ajax Metal Company described in some detail the work of Professor Girarde in France on gyratory stirring of molten metal and the effect of such stirring on the structure of cast iron, and pointed out that the cloud theory may apply to this gyratory stirring. Mr. Clamer further reported that it was his intention to inaugurate a research program of studying the effect of gyratory stirring or churning of molten metal in a crucible before pouring.

Further discussion pointed out that the idea that slag particles act as nuclei was advanced many years ago. In considering this in the case of steel these particles should be found at the centers or within the austenite grain but they are not so found. The presence of foreign particles might well act to obstruct grain growth rather than act as nuclei for starting of grains. The presence of such particles, in enormous number then, might well give small grain size. Superheating might cause the coalescence of the particles rather than a solution of them, and thus decrease the number of particles.

Sam Tour of Lucius Pitkin, Inc., pointed out that pursuant to the theory propounded by the authors, the presence of a large number of inclusions acting as nuclei for crystallization might result in a small grain size whereas a small number of particles would start a lesser number of grains and thus give a large grain size. Small grain size could then be caused either by the presence of an excessive number of such particles or by the total absence of such particles permitting under cooling, sudden crystallization and small grain size. Also, particles not acting as nuclei may act as grain growth inhibitors and again cause small grain size.

In replying to the various discussions, Mr. Lorig agreed in general with the statements made in each.

Report of Committee on Analysis of Defects

H. M. St. John of the Detroit Lubricator Company, as chairman of the AFA Non-Ferrous Division Committee on Recommended Procedure for Analysis of Defects, had prepared a report which was presented to the meeting by W. Romanoff as a member of the committee. The report presented definitions of eighteen different types of defects found to occur in castings and listed thirteen different operations in the foundry from which these various defects might originate.

Character of Defects

1. **Misrun.** A casting which lacks completeness due to the fact that the mold cavity has not been

wholly filled with metal. There may be a smoothly rounded hole through the wall of the casting or one or more extremities may be only partially filled out.

2. **Cold Shut.** The casting appears to be cracked but on closer examination it is found that the metal has failed to join or coalesce along the line of the apparent crack. In some cases partial coalescent leaves a line of weakness which later does crack.

3. **Shift.** A casting in which the cope and drag portions do not exactly match at the parting line.

4. **Crush.** A casting showing a deformation apparently due to displacement of the sand when the mold was closed.

5. **Variation in Wall Thickness.** A casting which at one or more points shows more or less metal than is called for by the print. It may be uniformly too heavy, uniformly too light, or may be too thick on one side of a cored cavity, too thin on the other.

6. **Sand Wash.** The casting may have rough lumps of metal at some point on its surface or may exhibit rounded corners which should be sharply defined. At other points there will be roughly granular depressions or holes.

7. **Sand Blow.** The casting shows an unnaturally smooth depression at one or more points on its outer surface.

8. **Core Blow.** The casting shows a smooth blackened depression on an inner surface where there is a cored cavity or, often, a large gas pocket with black surface in some heavy portion of the casting above the level of the cored cavity.

9. **Scab.** A rough spot, usually on a thin-walled portion of the casting, the wall being slightly thicker than normal at this point but shot through with numerous angular holes.

10. **Burning into Sand.** Certain outer parts of the casting have a rough, sandy appearance as if the metal had penetrated freely between the sand grains, some of which are completely surrounded and enclosed in the outer wall of the casting.

11. **Burning into Cores.** Sometimes a rough, sandy inner surface, similar to the penetration of metal into green sand, but more commonly in the form of metal fins penetrating into the core and containing trapped grains of core sand.

12. **Sand Sticking in Cored Cavities.** Even when there is no apparent "burning in," castings having intricate cored passages, or cavities of small dimension and relatively inaccessible, sometimes show a tightly adherent coating of sand.

13. **Superficial Imperfections.** Castings otherwise of apparently perfect quality sometimes have surface defects which may be of importance on the ground of appearance only. In other cases these apparently superficial defects are indicative of more deep seated ailments. The following are listed as typical:

A. **"Wormy" Surface.** The surface of the casting, usually in the vicinity of the gate, shows irregular depressions, shallow but elongated, similar in appearance to worm tracks. These depressions are often filled with a deposit of zinc oxide, and are sometimes accompanied by a very poor fracture, sometimes by an excellent fracture.

B. **Surface Stains.** The casting has black discolorations of varying size and shape.

C. **Tin or Lead Sweat.** The surface of the casting is more or less covered with a thin layer of the white metal. In the case of lead the sweat often occurs in spots or lumps, sometimes of considerable thickness.

D. **Rough or Pitted Surface.** Although the casting does not show evidence of sand washing or scab-

bing, the surface is rough or exhibits an occasional angular pit, sometimes so deep as to leave an objectionable scar on a finish-machined surface.

14. **Solid Inclusions.** With a fracture which otherwise appears to be good the walls of the casting contain particles or small chunks of non-metallic substance, or separate pieces of metal not coalesced with the body of the casting.

15. **Shrinkage Cracks and Cavities.** With a fracture otherwise apparently good the casting shows at one or more points a crack or cavity where the metal has pulled apart while it was still in a plastic condition. The walls of the cavity are usually tarnished to a color which varies from orange to dark brown.

16. **Weak or Discontinuous Structure.** The fracture of the casting is bad at practically all points. Commonly the structure is dendritic with minute fissures between the large crystals which are tarnished to an orange or brown color. Sometimes, with crystals of more normal size, the fracture is of a loosely granular—rather than fibrous—appearance. Other varieties of abnormal fracture may also be encountered.

17. **Sponginess.** This is a rather unsatisfactory term to describe the appearance of small but clearly discernible gas bubbles, usually segregated near the surface—but underneath the skin—of heavy sections of the casting. The cavities are approximately round and bright, free from tarnish.

18. **Subnormal Physical Properties.** The casting has no noticeable defect of any kind but fails to meet a standard test for strength, Brinell hardness or density, when subjected to fluid pressure.

So much for the symptoms. Having observed that his casting is defective the foundryman wants to know where to look for the source of his trouble. Occasionally this is obvious; sometimes what appears to be the obvious answer is dead wrong; in other instances no explanation seems even plausible.

The first step in an attempt to systematize the connection between effect and cause is to list in some sort of order the various operations in the manufacture of the casting where trouble may creep in. A tentative list of this kind is given below.

- I. Gating and layout of pattern.
- II. Condition of pattern, flask, core box, etc.
- III. Molding practice.
- IV. Quality and condition of molding sand.
- V. Quality and condition of cores, parting compound spray and the like.
- VI. Quality of the molten metal as delivered from the furnace. This may be sub-divided as follows:
 1. Quality of the various constituents in the metal mix charged into the furnace.
 2. Influence of the furnace atmosphere.
 3. Influence of the furnace lining and fuel (or electrodes).
 4. Influence of slag, fluxes and deoxidizers.
 5. Influence of the maximum temperature reached.
- VII. Pouring Temperature.
- VIII. Pouring practice (and skimming).
- IX. Cleaning practice (tumbling, sand blasting, etc.)

For a complete and exact diagnosis of foundry ills—which is admittedly hitching our wagon to a star—it is necessary for us to lay out as well as we can a plan by which the foundryman, having located his defect and given it a name, can at least link it up with the particular foundry operation responsible for the trouble. That, in itself, will not always indicate a

remedy, but certainly the first step is to learn at what point trouble occurred; this is often difficult enough. We should be able to agree fairly well on a simple general outline of this character. As we proceed from this point in an effort to define more exactly the source of the difficulty and then to prescribe a remedy, we will undoubtedly bring up points on which disagreement will exist. This, in itself, should be useful since it will point the way to the desirability of further experimental work in controversial territory.

At this time we have attempted merely to outline our problem and to indicate the manner in which we propose to attack it. Constructive criticism and suggestions are earnestly requested.

Non-Ferrous Round Table Luncheon Conference, Thursday, August 22.

The round table conference organized under the chairmanship of **H. J. Roast** of Canadian Bronze Company, Ltd., Montreal, was attended by a capacity group. To promote good feeling and frank expression, the chairman opened the meeting by a good song joined in by all present. Various problems were brought up by foundrymen present, discussed by others, and solutions offered by still others. As usual for these round table discussions, no record is kept of the speakers or of the statements made. The meetings are of great value to those who attend and can only be of value to those who attend.

The fact that all tables were occupied and that no one left the meeting prior to the time of adjournment and that the meeting lasted for the full period allowed, is positive indication of the value of the discussions to those present.

Non-Ferrous Technical Session, Friday, August 22.

James L. Wick, Jr., of the Falcon Bronze Company, Youngstown, Ohio, acting as chairman of this session first made a canvass of all present at the meeting to determine their interests, whether that of practical foundrymen, metallurgists, chemists, metal dealers, engineers, or of general interest from the consumer's standpoint. Of about sixty in attendance, a good representation from each of the above classes was indicated with a rather large percentage of foundrymen present.

The first paper was presented by **Dr. John A. Gann** of the Dow Chemical Company, Midland, Mich., "**Founding of Magnesium Alloys**," by **J. A. Gann** and **M. E. Brooks**. This paper gave a complete general description of methods of alloying, melting, fluxing, pouring of magnesium alloys and of molding, molding sands, gating, venting, etc., in the production of magnesium alloy castings. Four alloys known respectively as Dow Metal A containing 8% of aluminum and .2% of manganese, Dow Metal G containing 10% of aluminum and .1% of manganese, Dow Metal B containing 12% of aluminum and .1% of manganese, and Dow Metal H containing 6% of aluminum, .2% of manganese and 3% of zinc, were discussed in considerable detail. The flux used consists of 60% anhydrous magnesium chloride and 40% of sodium chloride. The alloys are melted in cast steel pots and are poured at an average temperature of 1300°F. into molds made from synthetic sand mixed with sulphur and boric acid and sometimes ammonium fluoride salts. The sand is wet with water plus glycol in the proportion of 75 of water to 25 of glycol. The alloys are heat treatable to give very considerable improvement in physical properties. Methods of scrap recovery, cleaning of castings, protections against fire

hazard, etc., are described. Many interesting applications of castings of these alloys are illustrated in the paper.

In discussing the paper, **Sam Tour** of Lucius Pitkin, Inc., called attention to the excellence of the paper, its great value to any foundryman considering making castings of these alloys, and complimented the Dow Chemical Company on its permitting the publication of such essential information. In the paper the authors describe a quick method of determining the amount of aluminum present in the alloys not containing zinc by means of hardness tests on chill cast test bars, and Mr. Tour asked that the authors add information regarding the effect of pouring temperature, mold temperature and time interval between pouring and opening the mold. The authors in the paper state that copper and nickel as impurities are very harmful to these alloys and Mr. Tour requested that they amplify this statement by giving certain maximum amounts of such impurities which should be allowed before rejection of the metal.

An exchange paper submitted on behalf of the Institute of British Foundrymen, prepared by **A. J. Murphy** of J. Stone & Company, Ltd., London, England, and entitled "**High Strength Non-Ferrous Casting Alloys**," was presented by **Sam Tour** of Lucius Pitkin, Inc.

The object of this paper was to demonstrate the wide range of non-ferrous casting alloys offering high strength in association with other desirable properties. High strength is a relative term, which has to be considered along with density, electrical and magnetic properties, corrosion-resistance, casting qualities, cost, etc. Manganese bronzes combine strength and hardness with resistance to sea water corrosion and good casting qualities, and are relatively inexpensive. Aluminum bronzes show tensile strength and hardness similar to the manganese bronzes, with higher fatigue strength and generally superior resistance to corrosion, but present greater difficulties in the foundry. The important nickel-base casting alloy is silicon-monel metal. The high melting point raises problems in melting and molding and the intrinsic cost is high, but the high strengths obtainable are combined with outstanding resistance to corrosion, and are also well maintained at high temperatures. The

zinc-base alloys are suitable for die casting. Aluminum alloys are used for castings in which high strength is attained by heat treatment. The outstanding alloys in this group are derived from "Y" alloy. The Ceralumin series of alloys in this category gives a range of properties depending upon the type of heat treatment applied. The heat treatment of magnesium alloys is a comparatively recent development, and Electron alloys, "A.8" and "A.Z.91" were discussed in detail. The properties and heat treatments of alloys coming under the above mentioned classes were reviewed.

In discussing this paper, **Dr. J. A. Gann** of Dow Chemical Company pointed out that in this country Dow Metal H is more generally used than the magnesium alloys mentioned by **Mr. Murphy**, had physical properties at least equal to if not superior to the properties of the alloys described by **Mr. Murphy**, and questioned whether these different alloys were adopted in Europe on the basis of some technical reasons other than final properties. **Dr. Gann** also discussed briefly the question of solid solubility of aluminum and zinc in magnesium.

Mr. Tour called attention to the distinction made in this country and not made in England, between permanent mold casting and pressure die casting. In the paper as presented the reference to die casting of aluminum bronze should be interpreted as referring to gravity pouring in permanent molds, whereas the reference to die casting in connection with zinc base alloys should be interpreted as referring to true pressure die casting. The illustrations of so-called typical die castings in "ceralumin" should be interpreted as meaning typical permanent mold castings in these alloys. With reference to zinc base alloys for die casting, Mr. Tour called attention to the practice in this country of holding the magnesium content in the neighborhood of .05% rather than using the maximum allowable of .1%, and further, that the specifications for these alloys in this country limited the amount of tin to not over .005% and the amount of lead to not over .007%.

Dr. O. W. Ellis of the Ontario Research Foundation of Toronto pointed out that the practice in America in manganese bronzes is not to hold the tin content very close to 1%, as indicated by the author.

Foundry Equipment Manufacturers Meeting

The meeting of all manufacturers of foundry equipment, including their representatives, was held on Tuesday, August 20, at the Royal York Hotel, Toronto, Canada, during the convention of the American Foundrymen's Association.

The meeting convened in the form of a dinner at 7:00 P. M. in private dining room No. 8 on the main mezzanine floor, Royal York Hotel. There was a brief business session at the close of the dinner, following which consideration of subjects of importance to manufacturers of foundry equipment received attention.

Frank Connolly, assistant to director of industries, Federal Housing Administration, Washington, spoke

on the subject "How the Federal Housing Administration Can Help You Sell Foundry Equipment." In view of the recent changes in the F.H.A. act this talk was timely indeed.

Thomas W. Pangborn, President of the National Founders Association, Chicago, spoke on "The Effect of Federal Legislation on the Foundry Equipment Industry."

The final talk dealt with "Cooperation in Industry" and was delivered by **Samuel John Frame**, Secretary and Trustee, Metal Exchange, Toronto, Canada.

Following each talk a period was set aside for discussion and consideration of any of the questions presented.

Super-High-Speed Cutting Tools For Non-Ferrous Metals

By W. B. FRANCIS

Associate Editor

New Alloys Require New Cutting Materials. Old Mixtures Cut More Easily

ANY invention that is fundamentally sound, practical and useful will start a multitude of industries. Such was the case with the invention of high-speed steel—a steel that will hold its cutting edge even when operated at a red heat. Previous to this invention, every metal and material was machined at the speed that carbon steel would stand, and it did not take much speeding or extra hardness of the material being machined to burn up the cutting tools. The moderate cutting speeds of carbon tools permitted the use of machines of slight strength and rigidity, and the use of undersized driving motors. Furthermore, the production or turnout of the shop was a matter of watchful waiting.

The coming of high-speed steels was the starting of a new era of production, and all the manufacturing industries began tuning up so as to keep in step with the rapidly growing competition for the business of an impatient world. Heavier and higher-powered machine tools replaced the old designs. Multiple operations and the use of stronger materials became the common order of doing things.

After the applications of high-speed steels got all set to double and treble production, and they are continuing to do so with greater increases today, another new era in cutting tools was started, a super-era in fact, builded on top of the one having the high-speed steel foundation. This era is the one of the invention and practical adaptation of the cemented tungsten carbide materials. These are of almost diamond hardness, and they have a toughness that enables them to cut any kind of materials and to operate enduringly at dizzy speeds.

With the improvements in cutting tools and the machine tools, known as the capital machines of industry, there has also been a wonderful increase in new materials and metals. Stainless metals, extra hard metals, extra soft metals, extra tough and strong metals—all of the ferrous variety—are now so numerous that a good sized catalogue is needed to list them. Then the non-ferrous field has widened immensely. The carbon steel cutting tools held their sway much longer in this field than they did in the ferrous. Just because the non-ferrous metals were considered soft, the idea prevailed that carbon steel

tools were equal to the necessary limits. But the kinds of new non-ferrous metals and of non-metallic materials also greatly increased, and qualities other than softness have predominated. The super-high-speed cutting tools have proved their usefulness; not only in machining the soft metals, but also the hardest and toughest of the many materials now in common use.

The special feature of the super-speed cutting tools is a small block of manufactured material having extra hardness and toughness, and a cutting edge shaped to the surface that is to be produced on the work. This block is brazed to a heavy tool steel shank, or to the body of the tool. In case the hard blocks or tips are used on saws, milling cutters, drills, reamers and the like, the heavy shanks are replaced by the tool body, except on the largest tools where small shanks are inserted in the bodies.

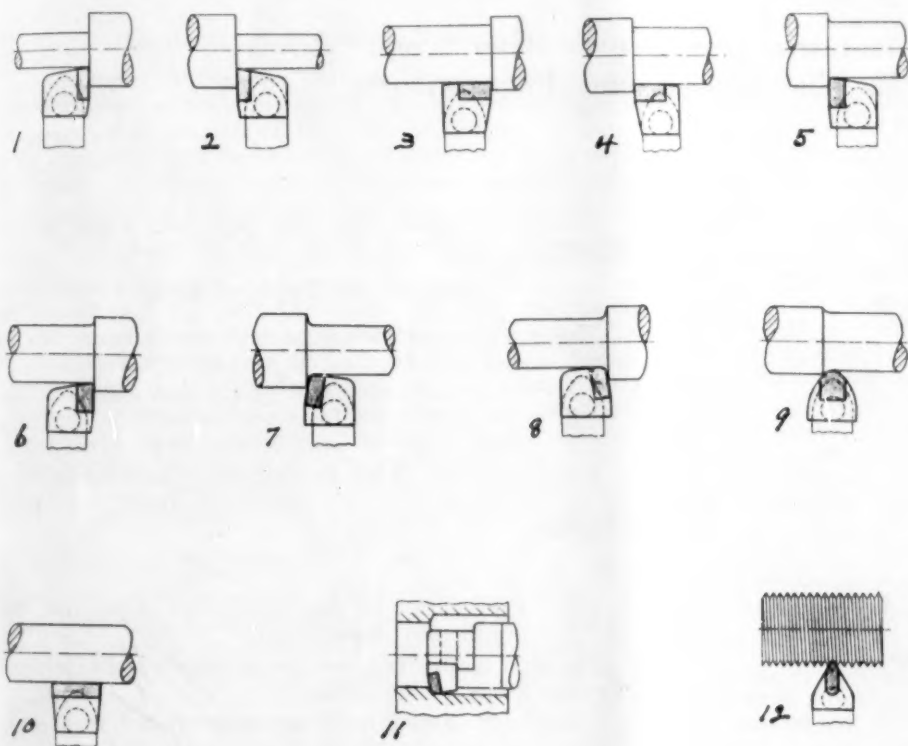
The hard tips consist largely of tungsten, which is the metal used for the filaments of incandescent lamps. The melting temperature of tungsten is over 6,000° F. When tungsten is highly heated in contact with carbon, a compound known as tungsten carbide is formed. This is extremely hard but brittle, and the pulverized carbide must be mixed with a cement or toughener, which is cobalt. After coating the fine carbide grains thoroughly with the cement, the material is molded under heavy hydraulic pressure into the various sizes and shapes of tool tips desired. These shapes are then fired so as to fuse the cobalt and produce a solid and toughened product known as cemented tungsten carbide. The composition of one of the important brands is as follows: Carbon, 5.7%; Tungsten 87.4%; Cobalt, 6.1%.

The complete tools may be purchased from the licensed manufacturers, or the tips alone purchased and the brazing done in local shops. Thin sheet copper makes a reliable braze. As the hard tips are expensive, they are used in the smallest blocks possible. It is necessary to mount and apply the tools according to the rules of the makers. Both the machines and the tools should be designed so as to stand high speeds and light feeds; also to be free from vibration and chatter. The cutting edges are resharpened by using a diamond filled grinding wheel. Wet grinding is recommended.

The super-tipped tools have long life and produce a

fine finish, and at speeds from 2 to 8 times those possible with steel tools. Their use is becoming well established in the major industries, such as aircraft, automotive, electric refrigerators, etc. Some of the non-ferrous metals and materials that are being machined with the cemented tungsten carbide tools are brasses, bronzes, aluminum, zinc, copper, magnesium, babbitt, solders, spelters, bakelite, rubber and its com-

tools or bits are illustrated in Figure 1. No. 1, 2, 3 and 4 turn square shoulders; No. 5, 6, 7, 8, and 9 turn filleted shoulders; No. 10 turns straight work; No. 11 is a boring tool; and No. 12 is a threading tool. Figure 2 illustrates the hard cemented carbide tips brazed to the heavy tool-steel shanks. The example at the top is a left-hand tool, and the one below is a right-hand tool.



Figs. 1-12.
Various Types
of Hard-Tipped
Lathe Tools or
Bits

pounds, porcelain, glass, paper, fiber, linoleum, marble, slate, etc. The cemented carbide is also excellent for drawing dies and nozzles.

The appearances of some of the hard tipped lathe

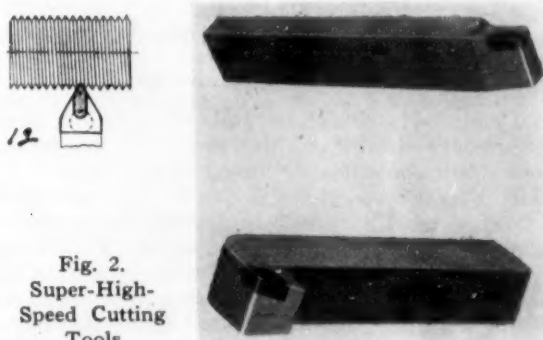


Fig. 2.
Super-High-Speed
Cutting
Tools

Remelting Aluminum Turnings

Q.—We have an oil-fired furnace with a 300 lb. crucible for melting down aluminum turnings, borings, and reclaimed aluminum particles from skimmings and slags. The latter particles have been reclaimed on a ball-mill type machine. When melting down this material to run it into ingots, we have an enormous amount of waste, due to the metal parts becoming a spongy mass, which does not melt and turns into slag, presumably as a result of the oxidation. We have tried all sorts of fluxes, but without solving our problem. Apparently, we need a flux or chemical substance which will protect the metal particles against oxidation.

A.—A crucible furnace is not the best furnace to use for reclaiming aluminum from turnings and skimmings. However, that is not the question.

Magnesium chloride as a flux for reclaiming aluminum is now used very extensively by smelters. In your case we suggest you use barium chloride. You will find it very good for finely divided material and it is possible to melt such material with a low loss. In addition, if you will mix your turnings with 5% of a mixture of cryolite and rock salt, 50% of each, it will also help. However, the barium chloride should be satisfactory alone. The amount necessary you will determine according to the class of material you use.

W. J. Reardon.

Better Returns From Scrap

By E. G. WERTHEIMER

Purchasing Agent, Federated Metals Corporation, Detroit, Mich.

Industrial Non-Ferrous Metal Scrap, Its Classification and Preparation*

PROBABLY no phase in connection with the sale of industrial waste material is of greater importance and consequence than that which refers to the classification and preparation of industrial non-ferrous metal scrap. This function is of rather recent origin. Certain types of industries have made rather important strides in this direction, particularly among the larger concerns where there has been enough of this type of material accumulated to justify the institution of a separate department. It may be well said, however, without fear of too much contradiction, that there is still much to be done in this direction. Many industries, both large and small, are losing substantial sums of money every year because they do not regard seriously enough the fact that failure to classify or properly prepare material will bring a lesser price for the product.

Sort the Scrap

Proper classification and preparation permits of accurately describing the article in accordance with designations commonly used in the trade. This permits a man remotely removed from a specific accumulation to read an accurate description of the material and bid on it without ever seeing it. Very little industrial non-ferrous metal scrap is accumulated in a form actually preferred by the buyer, unless it has first been either classified or prepared. Since the buyer must eventually do this if it has not already been done, why then it is not sensible to do the job at the point of origin, inasmuch as the material must be handled anyway?

The purchasing agent has a decided advantage in the sale of non-ferrous scrap metals. He knows the specifications, chemical and otherwise, under which the material was originally bought, and should use these in connection with the sale of the scrap.

Let me assure you that the waste-material department frequently can make much money for a company. The field for increased revenue is often much greater in this end of the business than in purchasing.

Many of the conditions which are common to every purchase transaction are frequently unheard of, or at least unused, in a scrap transaction. There are very few men in this room who would buy any article unless the following conditions were quite specifically agreed upon and stipulated:

Quantity	Specification or description
Shipping date	Kind of packages
Terms	

* A paper presented at the Annual Convention of the National Association of Purchasing Agents, May 21st, 1935.

Is it not strange then, that this same procedure is frequently not used in the sale of waste materials?

Sources and Types of Scrap

The preparation of industrial non-ferrous metal scrap might well be divided into three classes:

1. Scrap acquired from production departments.
2. Scrap acquired from maintenance operations.
3. Scrap acquired from dismantling operations.

Scrap acquired from production departments may be well divided into two groups as regards method of preparation, as follows:

- A. Preparation at the source or unit producing the scrap.
- B. Preparation of the scrap after it has left the production department.

The first group consists principally of the following five kinds of material:

1. Borings and turnings accumulated from machining operations.
2. Skeletons, clippings, and short ends accumulated from punching or shearing operations principally, and sometimes from other machining operations.
3. Solids found to be defective during the course or after completion of all operations.
4. Metallic residues, slags, skimmings, drosses, etc., accumulated through certain melting operations or plating operations.
5. Certain classes of non-ferrous metals used to process production items.

Something can usually be done in connection with the preparation of these five items at the point where they are produced without incurring any additional expense whatever. There are usually three possibilities with regard to borings:

- A. Borings produced in connection with the use of cutting oils or slushing compounds should be accumulated in containers which will permit proper drainage.
- B. Contamination of various compositions and kinds should be eliminated.
- C. Contamination with iron should be avoided.

Skeletons and clippings accumulated at the point of production must be carefully kept separate as to compositions. This will save an expensive sorting job in the waste material department.

Solids accumulated along a production line as scrap in various states of completion may frequently be kept separate to advantage. The flow of a red brass

casting through a plant might fall into the following four types of scrap, all different in value:

1. A rejected casting due to defective machinery.
2. A rejected casting after the application of a yellow brass part.
3. A rejection of this same casting after a plating operation.
4. The rejection of the casting in any of the above three states except that in addition there may be a free iron contamination such as a broken off drill remaining in the casting.

Contamination Reduces Values

Sometimes there are several types of drosses accumulated in an industrial plant. Where it is quite apparent that the value differs, due to richness or some other factor, then these quite naturally must be kept separate. I want to warn all those who have to contend with this type of material, that to begin with, the values are usually low, as compared to the metal from which they are made. As a consequence, contamination frequently reduces the value to a point where it scarcely pays to handle the item.

The type designated as processing scrap might be best illustrated by plating department items. Spent copper and nickel anodes must be kept separate as must likewise be the sediments recovered from the bottom of copper or nickel plating tanks. Racks, hangers and baskets may be kept separate according to the base metal from which they are made and further as to whether they are coated with copper or nickel.

Non-ferrous metal borings, if contaminated with other non-ferrous metals, cannot be separated. It may, however, be decidedly beneficial to put the borings through a mechanical device for removing the oil or slushing compound. Many of these are on the market, and most of them operate on a centrifugal principal. This operation has several desirable features. First, it reduces the liquid content of the borings. Second, the liquid material in itself may have a decided value. There are a number of plants, for example, who recover lubricating oil from borings by the means just mentioned. This lubricating oil is then further processed and, when recovered, still has a lubricating value practically equivalent to the original oil used.

Non-ferrous metal clippings, if contaminated, might be made more attractive by actually hand-sorting. With this class of material is connected another important operation to improve the value, namely the briquetting operation. Briquetting is not recommended except in cases where the scrap is of the finest character and there is absolutely no question of contamination. Many concerns have attempted to briquette their scrap but have found lesser value. The reason for this is that the original material could at least have been hand-sorted after purchase to remove the contaminating element, but when once briquetted, this is not possible.

With regard to solid scrap, if sorting has not already been done in the production department, then it can be done and should be done to advantage in the scrap department.

As a general proposition there is very little that can be done with residues as accumulated in production departments. The important factor is that they be uncontaminated.

Items of processing scrap such as nickel anodes may be treated advantageously in the waste-material de-

partment. These, in use as a rule, are suspended by hooks screwed into the end of the anode. These hooks as a rule are made of nickel, monel metal, or copper. If they are different than the anode metal they should be removed.

Scrap from Dismantling

Scrap which originates from maintenance departments and from dismantling operations, ordinarily is impossible to prepare at the source of production. It comes to the waste-material department far removed from the prepared state. I will attempt at this time to only discuss two out of hundreds of items which are customarily produced by these two departments.

One commonly found is scrap brass valves. These frequently have iron nipples or handles to be removed. Another item commonly emanating from this group is insulated copper wire. Insulation should be burned off by the seller. If it is not, it is then bought on the basis of a scientific guess. The buyer inspects and estimates the copper content and then deducts 10 per cent or more to make sure that his estimate is not too optimistic. Where material has its value inherently concealed or contaminated as is the case with insulated copper wire, then I am certain that removal of such elements where possible, will prove advantageous.

Copper wire or brass scrap accumulated in the production department is usually much different from similar material emanating from the maintenance department and frequently should be kept separate. Production department brass, for example, can be sold on a guaranteed specification as to analysis, but this is not true with regard to maintenance department scrap.

Systems in Operation to Increase Scrap Values

I will indicate some specific methods that are now in effect in order to show what some concerns are doing with special items in order to increase value or effect additional revenue.

A large concern separated the lead covering from its electric power cable by means of melting it off in a reverberatory type of furnace. This type of material, incidentally, carried a stranded copper wire core which, in turn, is covered with insulation and finally with a lead covering above mentioned. Buyers of both the lead and the copper are aware that the pig lead carried some copper and that the resulting copper wire carried some lead, and this contamination was unsatisfactory. The producing company changed its practice to the extent of first stripping off the lead mechanically and placing the resultant insulated copper in the furnace merely for the purpose of burning off the insulation. In this way the copper and lead were not contaminated with each other.

A scrap department employee one day noticed scrap iron being placed on a buyer's truck which emanated from a magnetizing machine over which brass borings were passed to remove the iron. This iron was found to contain valuable parts and tools and thereafter was first sorted for these, prior to sale.

A salvage department employee noted that ends of solder bars coming to his department from the source of their use, were from two to three inches long. He devised a holder for these ends which obviated the necessity of scrapping before the pieces were one-half inch in length or less.

A certain brass boring coming to a waste material

department was contaminated with wood sawdust. A confined stream of this contaminated boring was permitted to flow in front of a properly regulated fan. The result was a clean separation and a greatly improved boring as to saleable appearance.

These and many others I could tell about are merely examples of what good, common sense can do in order to improve the value of these materials. On occasion it is found that some considerable amount of ingenuity has been required to solve a special problem, but invariably the solution is of a rather simple nature and merely requires the application of good, common sense as before mentioned.

Good Grade of Labor for Sorting

I think that some very serious consideration should be given to the actual personnel in the waste-material department. I can frankly say that in some cases where certain difficulties have been encountered the primary reason has been that the personnel actually doing the work was not very carefully chosen. The class of men for this work should not be common laborers, as they frequently are. The man directly in charge should be alert and preferably have some previous experience in the handling of scrap metals. He should be able to exercise sufficient judgment in order to bring additional revenue. The man must be intelligent, aggressive, and sincere in his work.

Points for Special Caution

Material should be displayed in a well-lighted room, preferably daylight, since buyers of non-ferrous metal scrap can usually tell more about the value by exposure to daylight, than otherwise.

If material such as clippings is baled, the tops should be kept open to permit inspection. Single-decked barrels with open tops and aisles between rows of two

barrels are very satisfactory. Stacking barrels is not satisfactory, since the material is not accessible for inspection. Bags are satisfactory if the tops are kept open to permit inspection. None of these containers, however, should weigh over 1,000 pounds, because the industry is really not prepared to handle heavier packages.

Another factor of vital importance is that a very accurate scale be used. Best results are usually obtained from platform scales, having a set of standard weights as accessory equipment. Scales must be checked several times each day with these weights, and bi-monthly by a regular scale inspector. It must be remembered that this material is unlike steel scrap and much of it is worth between \$150 and \$300 a ton. Hence the buyer and seller both should be very anxious to see that accurate weights are obtained.

I think it is not alone an advantage, but necessary that sales proposals for non-ferrous scrap metals indicate the approximate weight of the items to be sold. Many buyers confine themselves either to the purchase of small lots, or of large lots, and the statement as to the approximate weights to be sold is apt to invite the very type of bidder who is accustomed to handling a lot of the size mentioned.

A function of the waste-material department, which frequently is not given very much consideration, is that of the handling of tare. Each container should be weighed before being packed.

An important feature in handling scrap involves its sale for re-use rather than for re-melting. Salvage concerns will pay much more for desirable material than may be received through scrap value. It is therefore, primarily important that some careful consideration and thought be given to all items which come into the waste-material department to determine definitely whether the items are re-usable or must be sold as scrap.

Recovering Silver from Stripping Solution

Q.—Please send us data as to the recovery methods of securing silver from silver strip compound composed of sodium cyanide and caustic soda. Also where the material recovered may be refined and sold.

A.—Place strips of zinc metal in the solution, suspending them from a rod; or hang loosely-coiled strips in a dipping basket so that they are covered by the solution. Or use granulated or mossy zinc, and stir often so that the liquid can come in contact with the zinc. The silver will slowly come out of solution and deposit on the zinc, in the form of a dark powder. Stirring or shaking will dislodge the silver crystals, which will sink to the bottom of the jar, and a fresh surface of zinc will thus be exposed.

About an ounce of zinc for each ounce of silver expected will probably be enough, but it does no harm to use more. Let the mixture stand overnight or longer, preferably in a warm place. The more zinc surface is exposed to the solution, and the oftener you stir, the sooner the process will be complete. Let the deposit settle.

Your solution doubtless contains some dissolved copper; this copper will come down with the silver and contaminate it.

When you think that all the silver has been thrown down in the solid form, take some of the solution—a

few drops will do—in a test tube or small glass vessel, and very slowly add a few drops of muriatic or hydrochloric acid. Poisonous fumes will appear; so do this outdoors or near a fan or flue. Add enough acid to neutralize the cyanide and the caustic soda—that may mean as much acid as solution. If any silver should still be present in the solution, the acid will convert it into the white curdy silver chloride. When this happens you will know that further treatment with zinc is in order.

When you are sure that all the silver has been thrown down, pour or filter off the solution and throw it away. The deposit of silver crystals can then be washed well and dried, and then may be melted together and sold.

Usually the best purchaser for material of this kind is the dealer from whom you buy your new silver.

—Jewelry Metallurgist.

Flux for Zinc

Q.—Kindly advise us what flux is used in melting down scrap zinc.

A.—The universal flux used for zinc is salamonniac.

—W. J. Reardon.

United Chromium Wins Patent Suit

Full Text of the Decision in the Case of
United Chromium, Inc. vs. General Motors
Corporation on the Fink Patent No. 1,581,188*

United States District Court, District of Connecticut.

United Chromium, Incorporated, Plaintiff, vs. General Motors Corporation, The New Departure Manufacturing Company, The Bassick Company, Defendants. No. 2284 Equity.

Livingston Gifford, George F. Scull, Esq., Gustave R. Thompson, and Newton A. Burgess, of New York, N. Y., for plaintiff.

Drury W. Cooper, Merrell E. Clark, Frank E. Liverance, Jr. and Harold F. Watson, of New York, N. Y., for defendants.

D. J. Thomas, Judge.

This is the usual bill in equity charging the defendants with infringement of letters patent No. 1,581,188 issued to Colin G. Fink on April 20, 1926, on an application filed December 19, 1925. The patent is for a "Process of Electro-Depositing Chromium and of Preparing Baths Therefor." By various mesne assignments title to the patent in suit is now vested in the plaintiff.

The proofs show that two of the defendants, viz. The New Departure Manufacturing Company and The Bassick Company have factories within the District of Connecticut, where they had carried on the chromium plating operations which are alleged to infringe the patent in suit. While there is no relationship between these two defendants they have been joined as parties defendant, and have not objected to the joinder, but have defended the case on the merits. It is admitted in the Answer that the third defendant, General Motors Corporation, owns a majority of the stock of The New Departure Manufacturing Company and controls and directs its business policies. While General Motors Corporation is not a resident of this District, nevertheless, for the purpose of this suit New Departure's factory in Bristol, Connecticut "has been and continues to be a regular and established place of business in the District of Connecticut for the General Motors Corporation" as admitted in Paragraph Four of the joint Answer of the defendants. Therefore, there can be no question but that the acts of New Departure constituting alleged infringements of the patent in suit are really the acts of General Motors. Therefore the same proofs of infringement as to New Departure may be taken as the proofs of infringement as to General Motors. Moreover, the defendant, General Motors Corporation, under its license agreement with the defendant, The Bassick Company, sends its agents into this District to aid and abet the alleged infringement by the

defendant, The Bassick Company. It thus appears that General Motors Corporation was committing the alleged infringing acts within this District,—is a proper party defendant to these proceedings and is bound by the final decree.

The patent in suit was held valid and infringed by this Court in a suit by this plaintiff against International Silver Company, and is reported in 53 F. (2d) 390. Upon appeal the decree was affirmed by the Circuit Court of Appeals, 60 F. (2d) 913. Claim 4, 6, 10, 13, 16 and 18 were in suit in the International case and the same claims are in suit in the case at bar.

The invention described and claimed in the patent in suit relates to electro-plating and more particularly to a process of electro-plating chromium from solutions of chromic acid.

There are two purposes for which chromium may be electro-deposited. One involves what is known as "winning" metal. This means creating metallic chromium which is to be used as such after it has been separated from the surface on which it has been deposited. The other consists of securing to some article a permanent chromium plating. So far as the Fink patent is concerned the electro-deposition of chromium may be for either of these purposes.

The invention claimed by the patentee is an improvement in the art of chromium plating. The literature on the subject dates back many years which fact is set forth by Fink in his specification, page 1, lines 15 to 31 inclusive. Therein the patentee says:

"For nearly a century there has appeared in the literature considerable matter in respect to chromium plating, and in that literature the use of chromic acid as an electrolyte, as well as the use of various so-called addition agents has been proposed. Notwithstanding these disclosures, a practical and commercially available process of electroplating chromium has not heretofore been known, nor have any of the attempts to establish the commercial art of electro-depositing chromium ever satisfied the test of actual commercial requirements. What attempts have been made have always given uncertain and unreliable results and have resulted in ultimate failure as a reliable or satisfactory commercial process."

The invention is further described in the specification, page 1, lines 32 to 50 inclusive, in the following manner:

"I pass an electric current (from an anode to a cathode, the latter serving as the object on which the metal is to be deposited) through a suitable chromium-carrying electrolytic solution, in the presence of a catalyst. The catalyst is, as usual, a bystander which does not enter into the electrochemical decomposition. The chromium-carrying electrolyte which I have found suitable for my process, is a solution of chromic acid, its degree of concentration as regards baths

* For the texts of other decisions on this patent, see *Metal Industry* for November, 1931, p. 465-8; September, 1932, p. 355-358.

of commercial interest ranging from about 150 grams per litre to saturation.

"The catalytic agent which I use is one having an acid radical which is stable in the bath and which remains stable under the actions which occur in the process when the current is passed through the bath. This catalytic agent is one which performs its action at the cathode."

Among the acid radicals proposed by the patentee is an acid having a sulphate radical which is represented by the chemical symbol SO_4 . S stands for sulphur; O for oxygen and the SO_4 is the sulphate radical which is the catalyst of the patent.

The patent discloses and emphasizes five rules essential to a continuous and commercial operation and asserts that the application of these rules transformed the art of small and impractical laboratory experiments into a continuous, practical and commercially successful chromium plating process. After all experimentation, Fink established the following rules which are set forth in his specification,—

"(1) In preparing the electrolyte all of the stable radicals (e. g. SO_4) must be computed whether originally in the chromic acid, in the catalytic agent, or otherwise entering the bath.

"(2) The amount of stable radicals (catalytic agent) in the bath should approximate 2.5 grams—be not less than one gram, and not exceed 5 grams of sulphate radical per liter of a solution containing 250 grams per liter of chromic acid.

"(3) The quantity of the catalytic agent should be regulated within said limits for continuous operation.

"(4) By adding to or subtracting from the quantity of catalytic agent (stable radicals) already present in the chromic acid solution the necessary amount to bring the total amount up to or down to the given limits.

"(5) For temperatures of 15°C to 40°C the proper film is obtained with current densities from $\frac{1}{4}$ to 1 ampere per square inch."

Prior to the discovery of these rules by Professor Fink no commercial plating was successful, but the evidence conclusively shows that if these rules are followed there will then result a practical, reliable and commercially available and successful process of electro-depositing chromium from chromic acid solutions and a reliable and commercially adaptable method of preparing the chromic acid electrolyte. The formulation of these rules was original with the patentee.

The defenses relied upon by the defendants are as follows:

1. Invalidity of the claims in suit because, defendants assert, "two of the four groups of catalysts which those claims purport to cover are admittedly inoperative to produce the intended results."

2. The process described in the patent in suit was practised by others more than two years prior to the date of the application which resulted in the grant of the patent.

3. Non-infringement.

The first defense is based on the admitted fact that neither the phosphate nor the borate radicals mentioned in the Fink patent can be used alone in the bath. However, the proofs show that each has some catalytic effect and that, therefore, they are stable acid radicals which, in the language of the Fink patent "must be computed" as part of "such agents, whether of one kind or another that are actually in the bath." The Fink patent mentions these radicals as "substances which I find available as catalytic agents and which remain stable," and nowhere says that either of them can be used alone. The Fink patent is neither erroneous or misleading as to these two groups. At

the most, reference to them is surplusage, since the patent names at least one group of catalysts which undeniably are highly efficient. That is sufficient under the law. In *American Sulphite Pulp Co. v. Howland Falls Pulp Co.*, 80 F. 395, Judge Aldrich, speaking for the Circuit Court of Appeals of the First Circuit, said, at page 401:

"Some of these compositions (named in the patent) stood the test better, made better linings, and did the work more successfully, than others; and as to such as he used, such as he described, and such as those skilled in the art could understand, he is entitled to protection."

In *French et al. v. Buckeye Iron & Brass Works*, 10 F. (2d) 257, Judge Denison speaking for the Circuit Court of Appeals of the sixth Circuit said, page 261:

"We do not overlook that the specification sets out an additional particular method and advantage which were perhaps impossible of attainment; but that should not prevent due protection for the results which were accomplished."

There is no merit in the first defense.

For the second defense, defendants rely strongly on the so-called Udy defense and the so-called Manhattan defense, neither of which was presented in the International case.

The so-called Udy defense is based upon the activities at Niagara Falls of Marvin J. Udy, a research chemist in the employ of The Union Carbide and Carbon Research Laboratories, a subsidiary of The Union Carbide and Carbon Company.

The proofs show that Udy was directed to develop a process for the "winning" of chromium from materials containing chromium. He began his experimental research with the Sargent article and for a long time used chromium sulphate in his baths. Like other followers of Sargent, he got results at times, but could not rely on them. Nothing resulted that was commercially useful. He found that chromic acid contained sulphate and he used barium to precipitate it out of the chromic acid. He analyzed his baths but now admits that his method of analysis gave wrong results, so that he reached the admittedly erroneous conclusion that he could electrolyze a chromic acid solution which was pure or which, at least, was free of any mineral acids. It is not clear when Udy changed his method of analysis and obtained accurate results.

In the fall of 1923, in the course of some experiments with coated anodes, Udy concluded that chromium sulphate was not necessary and that free sulphuric acid could be used instead. From this he developed a method for chromium plating in which he first treated the chromic acid with barium hydroxide as a precipitant for the sulphuric acid present to produce what he thought of as pure chromic acid. Then he added sulphuric acid.

Udy proposed to maintain such a plating bath by addition of his supposedly pure chromic acid produced by his barium precipitation method; and, in his patent application filed in June 1924, he said that "in this way, the bath may be preserved for months with little or no change in its composition or behavior."

In December 1923, Udy used his new method in a bath for about two weeks, plating some graphite strips to be used in experimental work by another subsidiary of The Union Carbide & Carbon Company. No adjustments were made to the bath while it was in use except water and the supposedly pure chromic acid. Only one analysis was made and that at the start.

All of Udy's work prior to 1926 was experimental. In connection with it, he produced some chromium metal, the primary object of his research. He also plated articles sent to him from time to time "as test pieces" in the experimental development of the solution." Udy's first commercial public work in chromium plating was in May 1926 at the Metals Protection plant in Cleveland, where a trial installation was made. This was a month after the Fink patent had issued, a year after Fink's commercial chromium plating operation on a large scale at the Center Street plant in New York City, and three or four months after the still larger Waterbury plant had begun operations.

Shortly after the Fink patent issued in April 1926, Udy's patent application, filed in June 1924, was amended by inserting certain expressions found in the Fink patent and by copying a number of the Fink claims. An interference was declared. While this interference was pending, the Company then owning the Fink patent and the Company owning the Udy application consolidated all their respective interests in chromium plating, including the Fink patent and the Udy application, in the present plaintiff. Under the Patent Office rules, the interference could not be continued because of the common ownership of the patent and the application, and it was necessary for the plaintiff to decide the question of priority since the Patent Office Examiner, over the objection of Fink, had held that Udy could make Fink's claims. The matter was placed in the hands of two reputable attorneys. Udy's then patent solicitor wrote to his Washington associate to get an extension of time in the interference because "it is going to require a good deal of work on our part to determine which party is entitled to the patent." About six months after plaintiff became the owner of the patent and application, on the advice of these two attorneys, Udy was asked to file a concession of priority. This he did but under protest. The Udy application was prosecuted further in an effort to get some specific claims but was then abandoned.

Defendants argue that this concession was filed in bad faith, but the circumstances fail to support such a charge. Indeed, it would have been to the plaintiff's advantage to have had a patent issue on the Udy application, if it had disclosed the Fink invention, since thereby the monopoly would have been extended at least two years or more and there would have been an advantage in Udy's earlier filing date. No right of the respective inventors were involved since each had assigned his rights. *Garfield et al. v. Western Electric Co., Inc. et al.*, 298 F. 659.

The situation here is similar to that in *United Shirt & Collar Co. et al. v. Beattie et al.*, 149 F. 736, in which Judge Cox, speaking for the Circuit Court of Appeals for the Second Circuit said, page 741:

"The question is at best a technical abstraction. No rights of rival inventors are involved, as the complainant, the Shirt & Collar Company, was assignee of both Pine and Dormandy, and that company, with full knowledge of the facts, took the patent, in accordance with what appeared to them to be the truth, in the name of Pine. A decision against Pine now will benefit infringers but will be no benefit to Dormandy."

Similarly, in the case at bar, the invention of the patent in suit belonged to the plaintiff no matter which of its two assignors had invented it. The public interest was not involved, unless there was a prolongation of the monopoly, and that is not present here, because of plaintiff's reliance on the Fink patent

which had already run for nearly two years when Udy's concession was filed.

Unless it is very clear that plaintiff's counsel made a legal mistake in advising the abandonment of the Udy application, then the Fink patent should not be invalidated. Such a ruling would only benefit infringers and would mean the loss to plaintiff of the fruits of the experimental work of its predecessors in title which resulted in the commercial process of chromium plating now so generally used.

While Udy wrote periodical confidential reports of his research, none of them was ever made public, certainly not until long after Fink's large scale operations had been begun. A number of copies of each report was made, of which Udy kept one.—another was kept in the research files at Niagara Falls, and the others were sent to the New York office of his employer. There is no proof that any one ever read any particular one of these reports. Becket, one of Udy's superiors, says he read a good many of the weekly reports generally and even a larger number of the monthly reports, but it does not appear that he ever read the particular reports on which defendants rely. Critchett, another superior, says that, while he was generally in touch with Udy's work, his knowledge did not extend to actual details. Becket says that "knowledge of the research work which Mr. Udy did was kept within the organization." The abandoned Udy application was a confidential communication and was not a part of the prior art. *Vacuum Engineering Co. v. Dunn*, 209 F. 219; *H. Ward Leonard Inc. v. Maxwell Motor Sales Co.*, 283 F. 62; *Walker on Patents*, Sec. 82. There is no proof that any one ever saw any of Udy's baths in operation and, even if they did, the nature of the process in use obviously would not be apparent.

Clearly, Udy's writings *per se* have no evidential value to support a defense. They were not publications. Like an application for a patent, they were confidential writings which were kept secret and inaccessible to the public. Udy did not, thereby "add anything to the sum of human knowledge." *Leonard v. Maxwell*, *supra*.

Even if Udy had invented the process of the Fink patent before Fink, such knowledge and use by Udy, under the circumstances as presented here, would not constitute a legal anticipation of Fink. In order to anticipate, such knowledge and use must have been accessible to the public whereas all of Udy's knowledge and doings were kept secret.

After referring to the statutory defense that the patentee "was not the original and first inventor or discoverer . . . of the thing patented", the Supreme Court of the United States, in *Alexander Milburn Company v. Davis-Bournonville Co.*, 270 U. S. 390, opinion by Mr. Justice Holmes, said at page 400:

"Taking these words in their natural sense as they would be read by the common man, obviously one is not the first inventor if, as was the case here, somebody else has made a complete and adequate description of the thing claimed before the earliest moment to which the alleged inventor can carry his invention back. But the words cannot be taken quite so simply. In view of the gain to the public that the patent laws mean to secure we assume for purposes of decision that it would have been no bar to Whitford's patent if Clifford had written out his prior description and kept it in his portfolio uncommunicated to anyone."

Also in *Charles J. Gayler and Leonard Brown, plaintiffs in error v. Benjamin G. Wilder*, 51 U. S. 476, the Supreme Court, speaking by Mr. Chief Justice Taney, said at page 496:

"... by knowledge and use the legislature meant knowledge and use existing in a manner accessible to the public."

With reference to the same subject matter, Judge Townsend, in *Matheson v. Campbell*, 69 Fed. 597 said, at page 604:

"The consideration received from the disclosure of the discovery to the public is the foundation of the right to the monopoly of the patent. As against an original discoverer, the law recognizes no distinction between the lost art, the abandoned experiment, and the secret process. Whether the conception slumbers buried in the ashes of the past, lies inchoate in the brain of the would-be inventor, or is locked in the breast of its creator, it cannot afterwards be dug up, developed, or set free, to question the title of the complete creation first brought forth into the world of knowledge, and thus, as the first born, the rightful heir to the patent estate. As against an original inventor, anticipation is not shown by prior use of the invention under conditions which fail to disclose its composition or operation. Such knowledge of the invention should be accessible to the public. In *Boyd v. Cherry*, 50 Fed. 279, 283, Judge McCracy says:

'If the alleged prior use of the process was under such circumstances that the public obtained no knowledge of the mode of its operation, or of the results to be obtained by it, there is no prior use, within the meaning of the patent law. If kept secret by the first inventor until the second has discovered it and given it to the public, the latter will be protected, for it is to him that the public is indebted; it is from him that the public has received value.' 3 Rob. Pat. 152."

In *Pyrene Mfg. Co. v. Boyce et al.*, 292 Fed. 480, Judge Woolley, speaking for the Circuit Court of Appeals for the Third Circuit, said at page 485:—

"In considering the several alleged prior uses set up by the respondent, we do not find that, within the authority of *Gayler v. Wilder*, 10 How. 477, 13 L. Ed. 504, they were 'so far understood and practiced or persisted in as to become an established fact, accessible to the public and contributing definitely to the sum of human knowledge.'"

It appears from the evidence and is clearly shown that all of Udy's writings and doings were, in the language of the decisions above cited, "confidential" and "private communications" and were "kept secret", and were never "accessible to the public", and they never "added to the sum of human knowledge." Consequently they do not constitute a defense of prior knowledge and use, nor are they part of the prior art. Defendant, however, cites and relies upon *Corona Cord Tire Co. v. Dovan Chemical Co.*, 276 U. S. 358, but as I read the case it is not in conflict with the conclusion here reached. As Mr. Chief Justice Taft said, the invention there could be expressed in one sentence,—“I claim the use of D. P. G. as an accelerator because I was the first person who observed its efficacy for that purpose.” The mere statement of this to any one would disclose the entire invention. Kratz, held to be a prior inventor, had tested D. P. G. as an accelerator and this work “was known to and participated in” by Kratz’ associate, the chief chemist of his employer, who corroborated Kratz’ testimony. Kratz also read a paper on his discovery at the Philadelphia meeting of the American Chemical Society entitled, “The Action of Certain Organic Accelerators in the Vulcanization of Rubber”, which was a review of the comparative excellence of a number of well-known and used accelerators. This fact clearly shows that Kratz’ discovery was not “secret”, but was “accessible” to the public. In *Brush v. Condit*, 132 U. S. 39, the prior use was “the public, well known, practical use in ordinary work” of an electric lamp “in the presence of the employees of the factory.” In each of the cases of *Coffin v. Ogden*, 18 Wall. 120, *Reed v. Cutler*, 1 Story, 590, 599, Fed.

Cas. No. 11,645, and *Concrete Mixing and Conveying Co. v. R. C. Storrie & Co.*, 27 F. (2d) 838, 840, affirmed 282 U. S. 175, all cited by defendants, the facts indicate that the anticipating prior use was open and accessible to the public and known to many persons. Furthermore, the Udy process, which is described in his abandoned application, does not anticipate the Fink invention nor did Udy practice the Fink invention.

The Fink patent discloses a practical, reliable and commercially available method for chromium plating continuously and with certainty. By it, as the Circuit Court of Appeals said in the *International Silver* case, “for the first time the art could turn out chromium plating with certainty”, and I add what I regard as important, the further element of commercial plating with certainty. It is Professor Stevenson’s uncontradicted testimony that the Udy process “would fail commercially.” This is true because the Udy process does not take into account the possible presence of acid radical catalysts other than SO_4 and because no additions are made to the bath in continuous operation except water and supposedly pure chromic acid. To obtain this, Udy proposed and used barium hydroxide to precipitate the sulphate in the commercial chromic acid. But this would not remove any other acid radical catalysts in the acid and, even as to the sulphate, the results are admittedly uncertain. Either some barium or some sulphate would remain in the acid. All this would upset Udy’s idea of maintenance of the bath by the mere addition of chromic acid. Nor would such additions take care of bath variations arising from drag-in, drag-out and spray losses.

Therefore, I conclude and find that the Udy process is uncertain, unreliable and not a practical, reliable and commercially available method. It has never been used commercially, and Udy himself in his first public work in 1926 at the Metals Protection plant dropped the barium precipitation step and maintained the bath just as Fink does. His two weeks’ operation of a bath in the research laboratory in December 1923, in which no additions were made except of chromic acid and water, was not sufficiently long to show that the Udy process would satisfy actual commercial requirements and was not the practising of the Fink invention.

Defendants assert that plaintiff has wilfully attempted to conceal this so-called Udy defense and because of this ask that all relief be denied. The facts do not support defendants’ assertion. None of the steps taken in the Patent Office were unusual. The existence of the Udy abandoned application would be apparent to anyone investigating the Fink file wrapper. No attempt was made to silence Udy even by retaining him in the employ of the Union Carbide & Carbon Company which owns a relatively small part of plaintiff’s stock. When he was discharged from that employ, Udy was permitted to carry away with him a full set of his reports, though he had expressed his resentment when he signed his confession of priority.

Udy’s experiments and Udy’s application did not negative novelty because they did not meet Fink’s claims. His experiments did not negative invention, because they never satisfied the requirements of the prior state of the art. His application did not negative invention because it never satisfied the requirements of the prior art, and because the process described by it did not correspond with Fink’s, either in mode of operation or result.

I, therefore, conclude that the Udy defense is not

sufficient to invalidate the Fink patent in suit.

The so-called Manhattan defense is based on the activities of the laboratory workers of The Manhattan Electrical Supply Company at its Jersey City Plant. Late in 1923, they began experimenting with the chromium plating of tools for some experimental work on dry batteries and continued that work into 1926.

The evidence shows that, like the Bureau of Standards, in the language of the Circuit Court of Appeals in the International case, the Manhattan workers "often got good results; it is equally plain that they did not know on what the results depended and could only rely on producing them."

Starting with the Sargent article, the Manhattan workers conceived the idea that the bath should have more trivalent chromium than would be derived from the chromium sulphate of the Sargent article, or, as they expressed it at that time, more trivalent chromium "than is theoretically required to combine with the SO_4 radical present" to form chromium sulphate. They were thinking in terms of chromium sulphate in the bath. They considered the radical, not as the important element to be controlled in relation to the chromic acid in the bath, but merely as the thing by which to measure the relative amount of trivalent chromium in the bath.

Although the Manhattan baths were analyzed at irregular times for chromic acid, trivalent chromium and sulphate, there is nothing in the Manhattan records to indicate that the analysis for sulphate was for any purpose other than as a measure of the amount of trivalent chromium above that which would combine with the sulphate to form chromium sulphate. Many of the analyses show wide departures from the amount specified in the Manhattan "formula" and yet nothing was done to regulate the sulphate content of such baths. In contrast, there were frequent treatments of the bath with methyl alcohol to increase the trivalent chromium content when trouble developed in the plating.

In July 1924, and therefore after Fink's date of invention, additions of chromium sulphate and of sulphuric acid were made to one of the Manhattan baths which had been producing bad plating from the first. Defendants urge this as proof that the Manhattan workers appreciated the importance of the acid radical. But the circumstances surrounding these additions, especially in the light of the subsequent history of this and other baths, contradicts this. When trouble in plating developed, there were repeated treatments of the bath with methyl alcohol and then a series of tests were made to determine what amount of trivalent chromium would give the best results. In these tests the sulphate radical content varied greatly but no attention was paid to that. Instead, the bath was given frequent treatments with methyl alcohol. Then some chromium sulphate was added to the bath and, later, several additions of sulphuric acid. Because of the absence in the laboratory records of the dates when the results of analyses were received, there is no proof that these additions were induced by the results of the analyses and some of them were clearly made independently of analysis. The recollection of the Manhattan workers as to these events, given ten years after the event cannot be relied on, especially since they now have the present-day knowledge of the essential thing in chromium plating.

That there was no thought of restoring the sulphate radical to the amount required by the original "formula" is evidenced by the many additions which were made in such a short period and which finally brought

the sulphate content up to nearly three times the amount called for by the "formula." Therefore, no further additions or subtractions were made, though the sulphate content continued greatly in excess of the "formula", sometimes exceeding Fink's limits, as now calculated. Obviously the Manhattan workers were floundering. Such additions of chromium sulphate and sulphuric acid as they made were like their additions of methyl alcohol, just to see what the effect would be, without appreciation of the essential chromic acid—acid radical ratio of the Fink invention or that the radical alone was important.

This conclusion is in accord with what the Manhattan workers did in the first half of 1925, more than a year after their experimenting began. A new bath was made up which gave "dark" plate from the beginning. Yet no analysis was made for five weeks and then the sulphate content was double that of the Manhattan "formula." Three weeks later, without further analysis, chromium sulphate was added at intervals of a few days. At that time, its sulphate content was three times that of the "formula." It is admitted that the additions were made to this bath to "try and see if an increase of chromium sulphate would remedy the trouble." The Manhattan workers, even at that late date, were thinking in terms of chromium sulphate, and their repeated additions of it, when the sulphate radical content was already double that of their "formula", emphasize the fact that they had not caught the essential idea and were groping in the dark.

During the period of the Manhattan experimentation, there were other baths, which were made up and which were discarded because, apparently, the Manhattan workers did not know how to correct them. In other baths, the sulphate radical content was allowed to wander haphazardly and often outside Fink's limits, without any attempt to correct it. In still other baths, the sulphate content remained fairly constant, not because of any regulation, but apparently fortuitously.

In these respects, the Manhattan history is like that of the Westinghouse Company. As the Circuit Court of Appeals said in the International case, *supra*, the Westinghouse Company also had "a number of baths in which the chromic sulphate and radical were within Fink's formula." But in December of 1925, the Westinghouse Company, just like the Manhattan workers, had "baths in which both the chromic sulphate and the radical ran well above his (Fink's) maximum."

On the entire history of the Westinghouse experimentation, the Circuit Court of Appeals concluded that "the proof is too uncertain that they had even established any limits to the ratio in terms of the sulphate; it certainly does not disclose the idea that the radical alone was important." Therefore, it follows that a consideration of the entire history of Manhattan leads to the same conclusion as was reached in the Westinghouse defense.

All of the proofs in the International case as to the alleged prior use by Westinghouse and Eastman have been incorporated in this case by stipulation and nothing has been added to them in this trial. The Circuit Court of Appeals held that these alleged prior uses did not anticipate and it is so held here. Nor do I find anything in the prior art patents or publications which can possibly be held to anticipate the Fink invention. The pertinent ones were discussed and decided by this Court and the Circuit Court of Appeals in the International case and it will serve no useful

purpose to rehearse them here. For the reasons herein given these various defenses fail.

The charge of infringement is based on the process used by the defendants New Departure and Bassick at their factories in Bristol and Bridgeport in this District. As pointed out, *supra*, the defendant General Motors admits that it owns the majority of New Departure stock,—that it controls and directs New Departure's policies in business and that the New Departure plant is a regular and established place of business of General Motors in this district. Under these facts, infringements in this district by its subsidiary, New Departure, are infringements by the defendant General Motors. *Industrial Research Corp. v. General Motors*, 29 Fed. (2d) 623; *Detroit Motor Appliance Co. v. General Motors*, 5 Fed. Suppl. 27.

Moreover, General Motors, pursuant to a license agreement with the defendant Bassick, sent its employee to the Bassick plant and in that factory set up and put in operation the first chromium plating bath used by Bassick and instructed the Bassick employees how to carry on the process which Bassick used. Consequently, General Motors is also a contributing infringer in this District if the Bassick process infringes. There is no material difference between the processes used by Bassick and by New Departure and they will be considered as one and the same thing and as defendants' process.

The plating operations, in defendants' process, are continuous and successful. The article to be plated is the cathode. The bath temperatures, the current density and the free evolution of hydrogen at the cathode are the same as in the process found to infringe in the International case.

Defendants' bath were made up of chromic acid and chromium sulphate. After being made up, they were analyzed and adjusted on the basis of such analyses. In operation, frequent analyses for chromic acid and SO_4 were made and the baths adjusted on the basis of such analyses. In adjusting for the SO_4 , sometimes chromium sulphate was used and sometimes sulphuric acid. One of the Bassick employees testified that after the determination of the total sulphates, he added either chromium sulphate or sulphuric acid "to bring up the concentration of total SO_4 to the same proportions as given in the original concentration in the old bath . . . heed being paid to the difference in sulphate contained in either chromium sulphate or sulphuric acid." In all cases, both in the original make-up and in the subsequent adjustments, the ratio of chromic acid to SO_4 was approximately Fink's optimum.

Defendants see to it that the chromic acid they use is free from other acid radicals as possible. General Motors' specifications for chromium plating chromic acid to be supplied to its subsidiaries limits the "sulphate (SO_4) to .25%" and "chlorine (Cl) none" and the agreed samples typical of that used by defendants come within these limits.

Present day suppliers of commercial chromic acid for chromium plating furnish such acid of very high purity. Defendants' expert admits that it was the use of chromic plating which induced the demand for and the supply of chromic acid free from other acid radicals. In 1928, one of the suppliers of chromic acid stated in its advertisement that "in the light of present knowledge it is quite evident that many of the baffling failures in Chrome plating in the past were due to impurities, some of which need only to be present in minute traces to cause disastrous results." In contrast, prior to the Fink invention, there were

instances of so-called "C. P." chromic acid containing 3% or more of SO_4 .

Defendants assert that they do not infringe because they are "following Sargent." Since the proofs here, as well as in the International case, show that Sargent's "followers never could depend upon his process" and defendants' process is admittedly dependable, it follows that defendants must be doing something which Sargent did not teach. Clearly it appears that defendants are controlling the acid radical catalysts of the bath as taught by Fink and as Sargent did not teach.

Defendants further assert that their insistence on chromic acid with very low acid radical content is in accord with what a Westinghouse experimenter did and which was referred to by the Circuit Court of Appeals in the International case as showing that this experimenter "had not grasped the critical facts." It is doubtful whether the unsupported testimony of one witness as to the alleged Westinghouse return of impure chromic acid is sufficient proof. This alleged practise certainly did not occur until September 1924, —several months after Fink's date of invention and therefore was not in the prior art. In any event, the Circuit Court of Appeals in the International case did not distinguish the Fink invention from the Westinghouse experiments merely because of this alleged insistence on having pure chromic acid. If it had, the defendant in the International case would not have been held to be an infringer, because that defendant also specified that "the sulphate content" of its chromic acid "shall not exceed 1/10 of one per cent."

It is clear that defendants, as well as the chromium plating art generally, now know "the critical facts" and therefore use chromic acid as low in other acid radicals as possible, so that additions to the baths will have a minimum disturbing effect on the acid catalyst content.

Defendants also assert that, starting their baths with chromium sulphate, they maintain them by controlling the chromium sulphate and not the SO_4 . While they do use chromium sulphate as a bath addition, it is clear that they use it merely as a source of SO_4 . That they sometimes use sulphuric acid instead of chromium sulphate shows this. In determining the amount of either chromium sulphate or sulphuric acid to be added, defendants utilize only the SO_4 content of the analyzed bath as compared with its original SO_4 content. While they calculate the amount of chromium sulphate which would contain the amount of SO_4 present in the bath, the witnesses are in agreement that that does not determine the amount of chromium sulphate actually in the bath. Because of the presence of other substances with which the SO_4 might combine, it becomes, as one witness testified "quite a matter of speculation" to assign the SO_4 among these different substances. Defendants' procedure is certainly quite different from that of the early Westinghouse chemist who really was attempting to determine the amount of chromium sulphate in his baths when Westinghouse experimenters thought chromium sulphate was the important thing.

Following the teachings of Fink,—and not Sargent, defendants analyze for the acid radical and base all their calculations for adjustment and maintenance on their radicals alone. When they do convert the SO_4 determination into chromium sulphate, they are doing an idle thing and merely speculating as to what might be the chromium sulphate content of the bath. What they really do is to keep "an eye on the radicals in the solution."

It must be held therefore that defendants' process infringes the Fink claims 4, 6, 10, 13, 16 and 18 in suit. For instance, referring to Claim 13, defendants carry on their chromium plating operations by plating on a cathode from a chromic acid solution in the presence of a hydrogen film and use the sulphate radical catalyst in an amount less than 5 grams per liter to 250 grams chromic acid. Referring to Claim 16, defendants analyze the new baths prepared by dissolving commercial chromic acid, and then adjust the baths so that the total amount of catalytic radicals

present is less than 5 grams per liter of solution containing 250 grams of chromic acid.

It follows therefore that there may be a decree for the plaintiff adjudging the patent in suit valid and infringing, an injunction, a reference to a master and an accounting of profits and damages. Submit decree accordingly properly consented to as to form.

Hartford, Conn., August 8, 1935.

It has been stated that an appeal is contemplated. —Ed.

National Metal Week

THE annual National Metal Congress and Exposition will be held in the New International Amphitheatre, Chicago, Ill., September 30-October 4, 1935. Five societies will co-operate this year: American Society for Metals; American Welding Society; Iron and Steel Division, A.I.M.E., The Wire Association and the Institute of Metals Division, A.I.M.E. The headquarters for the Congress will be at the Palmer House.

The sessions of the Institute of Metals Division will be centered on several topics: **Constitution; Reactions in Alloys; Gas Metal Systems.**

The papers now scheduled are as follows:

Tuesday, October 1

"An Investigation of the Zinc-rich Portion of the System Iron-zinc," by E. C. Truesdale, R. L. Wilcox, and J. L. Rodda.

"Influence of Lattice Distortion on Diffusion in Metals," by V. G. Mooradian and John T. Norton.

"A Study of the Molybdenum-carbon System," by W. P. Sykes, Kent R. Van Horn, and C. M. Tucker.

"Studies of Phase Changes During Aging of Zinc Alloy Die Castings, II. Changes in the Solid Solution of Aluminum in Zinc and Their Relation to Dimensional Changes," by M. L. Fuller and R. L. Wilcox.

"Quenching Stresses and the Precipitation Reaction in Aluminum-magnesium Alloys," by R. M. Brick, Arthur Phillips, and A. J. Smith.

"Notes on the Crystallization of Copper," by Alden B. Greninger.

Wednesday, October 2

"The Reduction of Chromic Oxide by Hydrogen," by F. C. Kelley.

"Solubility of Oxygen in Solid Cobalt and the Upper Transformation Point of the Metal," by A. V. Seybolt and C. H. Mathewson.

"The Thermal and Electrical Conductivities of Copper Alloys," by Cyril Stanley Smith and Earl W. Palmer.

"Deformation Rates of Single Crystals of High-purity Zinc," by R. F. Miller.

Some of the most important metal manufacturing companies will exhibit their products. The **American Brass Company** will occupy space B2 and the central feature of the display will be a welding booth in which C. E. Swift, welding engineer, will give a

demonstration of gas and high voltage arc welding. The arc welding will be done on samples of copper and brass and bronze, using Anaconda phosphor bronze "D" welding rods; the oxy-acetylene welding will be with Tobin bronze rods. They will also show displays of welded Everdur tanks, and Anaconda welding rods. Those in attendance besides C. E. Swift will be W. E. Swift, W. C. Wallis, N. Brandtberg and W. H. Dowd.

The **Brown Instrument Company** and **Minneapolis-Honeywell Regulator Company** will have a combined exhibit in booths J-15 and J-19. The combined exhibit will include new and improved recording and automatic control equipment for the production, fabrication and heat treating of metals. Several models of the new Brown Air-O-Line controllers for the automatic control of temperature, pressure and flow by means of air operated valves will be shown. In addition, both the proportioning type and the mercury switch type of electrically operated automatic control instruments will be exhibited in conjunction with a wide variety of electrically operated valves. The Proctoglow combustion safeguard system will also be exhibited.

Molding Metal Inserts in Rubber

Q.—How can we get a good union between metal inserts and the soft rubber articles in which they are molded? Will plating the steel inserts with red brass make the rubber stick?

A.—The kind of metal has little to do with the grip; except that any surface that naturally corrodes would likely loosen while in service. Any plain or plated metal that will suit the color and the strength required in the service would do. Stainless steel inserts or those made from non-ferrous metals would likely be satisfactory.

A slight change in the design of the insert will insure its holding in the rubber. Thus a little bulge or fin or flange will do the trick and not increase the cost, or require any special care in handling the parts. An increase in the pressure applied to the stock when in the dies would have the tendency to overcome the shrinkage and thus produce a stronger bite of the rubber on the metal.—W. B. Francis.

EDITORIALS

The Cause and Cure of Depressions

A BOOKLET that is provocative of serious thought is "The Chief Cause of This and Other Depressions" by Leonard P. Ayres, vice-president of the Cleveland Trust Company. According to this writer's conclusions, the changes in the volume of purchases of durable goods by business enterprises constitute the controlling factor accounting for most of the depth of the depressions and most of the vigor of the recoveries of the peace-time cycles of recent decades.

The present depression, which is now in its sixth year, had its roots in the World War, which caused commodity price inflation, farm land speculation, then price deflation and a short post-war depression (1920-1). A period of city prosperity and widespread speculation followed and finally a terrific secondary price deflation and a long secondary post-war depression. The pattern of this movement has been similar to those of other movements after other wars, except that this war was practically world-wide and involved almost all of the nations. The most serious and important symptom of such depressions is unemployment. About half of the present unemployed would, in normal times, be producing goods; the other half, providing services. About half of the goods producers make consumers' goods, the other half making durable goods. The unemployment among the durable goods industries amounted to 77 per cent of the unemployment among the producing workers. Over 70 per cent of the value of the purchases of durable goods are made by business enterprises, **not individual consumers**. The changes in the prosperity of the durable goods industry depend, therefore, largely upon the volume of buying by corporations.

This evidence leads Mr. Ayres to the conclusion that trade cycles are caused mainly by changes in the volume of purchases of durable goods by business enterprises, and that consequently a recovery depends upon the prospects of business profits, and the stability of the fundamental conditions under which business operates. Those fundamental conditions call for peace; sound money; balanced budgets; sound banking; the restriction of credit to loans justified by earning power; the restriction of speculation; Governmental regulation of business to prevent abuses, dishonest competition, and exploitation, but not to control wage and price competition or to favor special groups.

Mr. Ayres' stand is representative of the thought of a large part of our business public. It is not in agreement with the trend of the last two or three years in Washington. Which side is right is a question, which may never be settled as there is no such thing possible in the economics of a nation as a controlled experiment. By the time we could get around to trying all of the different plans favored by large sections of the people, we would probably have recovered naturally—or died of the experiments!

And when the next depression comes, it will take us just as much by surprise and recovery will be just as difficult as in the past!

Trade Co-operation

THE growth and spread of trade associations during the past few years is an interesting phenomenon, unquestionably a result of the times. It is not, however, new or novel in principle.

Trade associations had their inception in the early middle ages. In those days business men co-operated actively in guilds for their mutual benefit, as far back as the 1200's.

They differed in one important essential from trade associations of to-day. Theirs were closed and secret organizations, very jealous of their secrets and with exceptionally high standards of artisanship. To-day, the trade associations welcome almost all comers and divulge information freely, not only to their members but to the public as well. A large part of modern association work is the promotion of fair competition, the setting of standards of quality, maintaining good relations with workers, setting standards of safety and health, uniform cost accounting, setting up fair trade practices, publicity, and many other activities which were undreamed of only a short time ago. Modern needs have called for modern methods.

Not that the road has been easy. There have been many stumbling blocks in the way. All too often the selfishness of the individual has stood in the way of continued co-operative effort. A common ailment is lack of finances to carry on a proper program. Everywhere there is the cry that the other fellow will not co-operate, but gives only lip service using the group for his own advantage. The fact is that if business men would devote a reasonably small part of their time and patience to cultivating and understanding their competitors, most of the destructive competition could be eliminated. Personal contact, over-the-table talks, a belief in arbitration rather than war—these are the fundamentals which make trade co-operation effective. As A. P. Munting said in a recent address to the Master Electroplaters' Institute of the U. S., co-operative courage is a fundamental need of industry.

Every industry which has continued to support a trade association has found that in the long run it pays. Immediate results are often disappointing. There are many failures in individual instances, but a few successful cases pay many times over for a large number of failures. And it must be borne in mind that without trade associations, there would be nothing but failures, as there is absolutely no chance for widespread co-operation.

It is not a question of abstract morals or unselfishness or righteousness. It is a matter of enlightened self-interest to work co-operatively for the industry as a whole and to help one's competitors. In the long run, it pays.

Salvaging and Preventing Waste

THERE is no time like a depression for applying the microscope of keen scrutiny to every plant operation. In high times the cry is production; in low times the need is for saving. A great deal of

waste, especially in this country, is, generally speaking, due to the fact that we have not been accustomed to think about anything but getting the business and producing the goods. For that reason, the paper by T. H. Owens of the Westinghouse Electric and Manufacturing Company, presented at a recent meeting of the American Society of Mechanical Engineers, has an appeal which is worth considering.

Large plants are famous (or infamous as the case may be) for the amount of waste, due to the scale of operations and the impossibility of equalling the close supervision of the small shop. It is important, however, in going into the question of waste, to be sure before undertaking any salvage or reclamation operation, that it will give a net profit in excess of the value obtainable for material, if it were disposed of as scrap in its present condition. When apparatus to be dismantled does not contain parts that have intrinsic value, it is generally more economical to sell it as junk than to do the dismantling work oneself.

In some instances the problem is simple. Scrap non-ferrous metals can be used again in the plant or sold for their metallic value. Scrap wire can be baled and remelted, care being exercised to cut off or treat separately such items as copper with tinned or with soldered ends. Non-ferrous turnings are always troublesome because of the different types of alloys machined. They have considerable value when one alloy is not contaminated with another, but if for example, the iron is not taken out or if different types of turnings are mixed, their value is greatly reduced. The answer is careful segregation at the source, with careful marking and careful storing in cans or bins, one for each type of mixture. Slags and floor sweepings from foundries can be reclaimed by crushing and concentrating; iron, by magnetic separation.

At the back of the whole problem of the handling of waste materials is one fundamental consideration. The best way to cash in on waste, is to have as little as possible; to save it at the source. Proper foundry practice, the proper design of castings, the standardization of products, reducing styles, types and sizes to a minimum, are all a part of waste prevention. Another well known method of saving waste is repairing by welding.

Mr. Owens cites one interesting example. His company has been for years re-sharpening worn files, thus getting out of them 4 to 5 times as much service as can be had from new files. Steam at 90 pounds pressure is used to blow fine silica sand against the back of the file teeth. After this operation, the files are dipped in a mixture of 2 parts kerosene and 1 part machine oil, and then wrapped in paper. When this process is no longer effective as a re-sharpener, the files can be sent to shops for re-cutting. A saving is cited by re-sharpening at a cost of 2c as against 35c for new files.

America's Silverware Center

JUST as Connecticut is the brass center of the United States, so it is also the silverware center. Both the state and the industry have interesting histories. W. S. Snow of the International Silver Company, has published several informative articles on the subject of the silverware and silver plate industry.

The date of the first pewter manufactured is shrouded in mystery, but it seems that one of the earliest in this work was Ashabel Griswold of Meriden, Conn., who started in 1808, making pewter. The industry went on growing slowly as Britannia and

pewter ware manufacturing until the 1850's, when the Meriden Britannia Company began to experiment with silver plating. By 1856 over 75 people were employed in its plating room.

Silver plating in the United States seems actually to have started in 1843 in Granby, Conn., in the plant of William B. Cowles and Company, in which the Rogers brothers were interested. In later years, the Rogers started their own plant for plating and out of that grew the famous "1847" line.

By this time the industry had practically settled in its present center around Meriden. The succeeding years saw it growing in a steady fashion until 1898 when the International Silver Company took over 13 independents in the United States, 4 more in the next year and several others in the years that followed, in addition to Canadian plants. From that time onward, the center of gravity in the silverware industry has been definitely in Meriden. Her title "The Silver City" by which she has been known for half a century, it seems will continue to be hers for many decades to come.

"Crystallization" of Metals

IT TAKES a long time to lay a ghost and some ghosts, perhaps, are never laid. One such spectre seems to be the idea that metals crystallize under vibration. For years the technical and scientific press has been exposing this fallacy. Nevertheless in the published accounts of a recent endurance flight of an aeroplane, it was stated again and again, that the metals might fail due to "crystallization" under vibration in service.

A note published in the August issue of the Technical News Bulletin of the National Bureau of Standards, summarized this subject clearly.

The erroneous belief that metals crystallize under vibration originated from the fact that fractured surfaces of metals present a crystalline appearance. It has long been known that all metals in the solid state are aggregates of crystalline grains, largely of microscopic size. This crystalline structure is not altered by mechanical forces alone unless they, at the same time, alter the outward form of the metal part. When a piece of metal breaks from a jar or single shock, the fracture takes place along the natural cleavage planes through the crystals. In brittle metals or alloys such fractures may take place without deformation of the outward structure of the piece. In ductile metals, however, the part will be considerably deformed before fracture occurs. In such ductile alloys, repeated applications of force can be applied without deforming the piece, until the "fatigue limit" is reached. Then a fracture originates at some point where the stress is greatest and the strength of the piece is least. Perhaps a microscopic crack already exists. Such a crack is a point of local weakness and grows with repeated stress applications, generally perpendicular to the direction of the applied force. The advancing crack cuts off more and more of the sound metal until finally complete rupture occurs. The final failure is always sudden and in many cases the crack is invisible until the failure takes place. The fractured surface is, of course, crystalline in appearance. Hence the conclusion that the metal "crystallizes."

The fact is that failure in metal parts is due not to "crystallization," but to a weak spot at which the part gives way, due to a sudden stress of too great proportions or to repeated stresses which have continued beyond the fatigue limit of the metal.

New Books

Principles of Physical Metallurgy. By Gilbert E. Doan. Published by McGraw-Hill Book Company, Inc., New York. Size 6 x 9, 332 pages. Price \$3.00.

This book is an unified account of the behavior of metals under the influence of the operations which are performed on them during the processes of fabrication and assembling. The author approaches the subject from the standpoint of classical physical chemistry and chemistry. The work is especially fortunate since it brings within two covers the results of the recent discoveries in the crystal structure of metals including such phenomena as the non-equilibrium conditions including age hardening; the rates of reaction of super-cooled phases; the predictable properties of alloys and the crystal structure of alloys.

The book is divided into three parts. (1) Physics of Metals; (2) Metallography; (3) Metal Technology. In the third part of the commercial alloys, processes and industrial methods of forming metals, heat treating, testing, etc., are fully described.

Electroplating, by Field and Weill. Published by Pitman Publishing Corporation. Size 5 x 7 1/2, 256 pages. Price \$2.25.

This book which is in its second edition is a mixture of the old and new in electroplating. It has somewhat the old style, broad, general descriptive tone. Definite information is not to be found in all chapters, but some few are superior observations. Thus the notes on throwing powers should be of value to the average plater.

Technical information to be of value should give actual figures where possible. While this is not always possible in electroplating practice, such statements as "The liquids are not unduly volatile," (in describing vapor degreasers), and "Few metals withstand the corrosive action of chromic acid, the usual run of metals rapidly dissolving in it," are unnecessarily ambiguous.

Many of the points mentioned in the text would be considered out of date in American practice. Thus a nickel solution composed of only 4 ozs. per gallon of double salts and 8 ozs. per gallon of single salts would be given no consideration whatever, even for light plating.

Lead tank linings for cyanide solutions are not usually thought satisfactory, the lead being slowly attacked. It is needless since a plain steel tank will stand up very well. Also, iron tanks for chrome which the book describes are considered very bad. Lead lined chrome tanks are the rule rather than the exception. The evils of iron in a chrome solution are given in the book itself. Wood construction on the top of a chrome tank is also out.

Any book on electroplating brought up to date should give some of the space devoted to rocker arm manipulation on generators for the purpose of reducing sparking, to a description of interpoles. All present day machines are interpole, fixed brush stud type, and commutator sparking is reduced to almost negligible proportions.

Many of these points are of interest in that they show the difference between American and British commercial operations. Thus, few if any manufacturers in this country would consider a foot operated sand blast or scratch brush lathe; also the use of oblique plating barrels or cylinder barrels.

The recovery of silver from silver cyanide solutions by evaporation and then treating with muriatic acid is troublesome and dangerous. The large quantity of gas given off is more than carbon dioxide (which is all the book states). It is also the extremely poisonous hydrocyanic acid gas.

G. B. Hogaboom, Jr.

Book of Stainless Steels. Edited by Ernest E. Thum. Published by American Society for Metals. Size 6 x 9, 787 pages. Price \$5.00.

This work, now in its second edition, is the result of the combined efforts of 75 authorities on different branches of the subject. Twenty-two chapters have been thoroughly revised or entirely rewritten. The book, it is said, is the only one which describes the properties of the principal types of stainless steels.

The subject is covered thoroughly. After a section on General Considerations, including History, General Requirements and the Constitution of Chromium and Chromium Nickel Steels, the book describes Production and Fabrication, covering Melting, Casting, Foundry Practice, Rolling Mill Practice, the Manufacture of Stainless Plate, Seamless Tubes, Drop Forging, Wire Drawing and various other types of fabricating operations, such as Welding, Grinding, Polishing, etc. Part 3 is devoted to the Properties of Typical Alloys. Part 4 describes Specialized Tests.

An interesting innovation is Part 5 which describes the Requirements of the Consuming Industries (chemicals, paper mills, pharmaceuticals, dairies, etc.)

The book is an indispensable part of the library for metallurgist and metal products manufacturer.

Enamels. By A. I. Andrews. Published by the Twin City Printing Company. Size 6 x 9, 410 pages. Price \$5.50.

This work covers the principles of porcelain enameling and their application. It includes a practical discussion of all of the processes, from the raw materials to the properties and methods

of testing. It includes also a large number of illustrations, diagrams and tables, and has, it is stated, been sponsored by the Porcelain Enamel Institute.

Chapter headings give an adequate idea of the ground covered: History of Enameling; Raw Materials; Fundamental Considerations; Preparation of Metal Surfaces; Enameling Compositions; Frit Making; Milling and Mill Additions; Application and Control; Properties and Tests of Enamels.

Specifications for Quality of Plated Coatings and Recommendations for Making Same Effective Throughout the Electroplating Industry. Approved and Adopted at the Second Annual Meeting of the Master Electro-Platers' Institute of the United States at Bridgeport, Conn., June 8-9, 1935. Reprinted from *Metal Industry*, July, 1935. Free with subscription to *Metal Industry* or *Platers' Guide*.

These Specifications were formulated after a two-year research at the National Bureau of Standards in Washington, D. C., sponsored by the American Electro-Platers' Society. They have been accepted as Tentative Standards by the American Society for Testing Materials.

The Specifications cover the electro-deposition of nickel, chromium, zinc and cadmium on steel.

Error

In our May issue on page 174, in a short review of the Handbook of Chemistry by N. A. Lange, published by Handbook Publishers, Inc., Sandusky, Ohio, it was stated that the book contained 248 pages. This was an error. The correct figure is 1265 pages plus 248 pages of mathematical appendix, making a total of 1513 pages in all. The price is \$6.00.

Government Publications

Mercury Industry in 1934. Advanced Summary. U. S. Bureau of Mines, Washington, D. C.

Review of Literature on Effects of Breathing Dusts, with Special Reference to Silicosis. By D. Harrington and Sara J. Davenport. U. S. Bureau of Mines, Washington, D. C.

Proposed Federal Specifications for Hardware and Fittings for Lavatory Partitions and Inclosures. Federal Specifications Board, Rm. 751, Federal Warehouse, 9th & D Streets, S. W., Washington, D. C. Comments and criticisms are invited; and should be in the hands of the Federal Specifications Division at the above address not later than September 16.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS

METALLURGICAL, FOUNDRY, ROLLING MILL, MECHANICAL, ELECTRO-PLATING, POLISHING, AND METAL FINISHING

H. M. ST. JOHN

W. J. PETTIS

W. J. REARDON

W. B. FRANCIS

G. BYRON HOGABOOM

T. H. CHAMBERLAIN

WALTER FRAINE

Copper, Nickel and Black Nickel

Q.—Am sending you by today's parcel post three solution samples—cyanide copper, nickel and black nickel.

The nickel is a 20-gallon solution, which is doing good work except that the throwing power is low.

The copper is a 10-gallon cyanide solution. This is an old solution and is working only fairly well. The formula calls for about 5 pounds of copper sulphate ammonia, and maintains some free cyanide in solution. In making up solution, enough sodium cyanide is to be added to bring to light straw color.

The black nickel is a new solution and has not given very uniform results. This is a 5-gallon solution.

A.—Analysis of white nickel solution:

Metallic nickel	3.6 oz./gal.
Ammonium chloride	1.5 oz./gal.
pH	6.8

The solution is low in chloride and the pH is too high. Add 30 oz. ammonium chloride and 2 fl. oz. of concentrated sulfuric acid to the bath.

Uniform results may be obtained in the black nickel bath by adjusting the pH. Add 1/3 fl. oz. of concentrated sulfuric acid to the bath.

It will be more convenient to discard the cyanide copper solution and make up a new one. The formula for a cyanide copper bath is:

For 10 gal.—

Copper cyanide	30 oz.
Sodium cyanide	45 oz.
Sodium carbonate	20 oz.

The approximate cost of this bath will be about \$2.00 for 10 gallons. The solution made up as per your letter is not recommended for best results.

G. B. H. Jr., Problem 5,416.

Joining Knives and Handles

Q.—Kindly inform us the factory method used in installing stainless steel blades in hollow handled knives. Lately we have had considerable difficulty regardless of whether the handles were plated before or after installations; all of our handles are joined to the blades with soft solder.

A.—Methods used successfully for installing stainless steel blades in hollow handled knives are as follows:

Method 1. A waterproof cement is used, made by mixing finely powdered litharge and glycerine. The glycerine should be added in an amount equal in volume to half the volume of the powdered litharge and mixed thoroughly. The end of hollow handle is filled with cement and then insert the blade. Setting time about 45 minutes. Mix only enough cement as needed as it sets quickly becoming hard and insoluble.

Method 2. The stainless steel blade is first thoroughly tinned and then soldered in place. It is necessary to have all parts clean and free from scale. Solders used are either 50% tin and 50% lead or 66% tin and 34% lead. Flux used is made up of zinc chloride, commercial grade—37 gm; glacial acetic acid 99.9%—23 gm; hydrochloric acid (commercial), 34.5%—40 gm.

T. H. C., Problem 5,417.

Discolored Gold

Q.—Gold solution made up of

Gold chloride	6 oz.
H Cl	10 oz.
Water	1 gal.

Room Temp.—2 to 3 volts.

Work flashed in cyanide gold; comes out bright, like sample.

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: Employed by:
 Kind of solution: Volume used:
 Tank length: width: Solution depth:
 Anode surface, sq. ft.: Cathode surface, sq. ft.:
 Distance between anode and cathode: Kind of anodes:
 Class of work being plated: Original formula of solution:

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible.

Use separate sheet if necessary. _____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

Then placed in chloride solution, comes out blue—like sample. What is wrong?

A.—The deposit of gold from the cyanide solution is extremely thin and very porous. When the article is put in the acid solution it is attacked through the pores of the gold and produces the discoloration.

It is necessary to put several hours cyanide gold on the work before placing in the gold chloride, or at least enough gold to prevent the attack as described.

A heavy deposit of gold can be obtained from the cyanide solution alone provided it contains sufficient gold content. It might be advisable to evaporate the gold chloride solution to dryness and use the resulting chloride as addition to the cyanide solution and do all the plating in this solution. Care must be used in evaporating the chloride solution to prevent overheating or the gold chloride is decomposed and becomes difficultly soluble.

G. B. H. Jr., Problem 5,418.

Oxidizing Nickel Silver

Q.—Will you please inform me if it is possible to oxidize nickel silver or articles made from nickel silver without first applying a deposit of silver?

A-1.—It is difficult to obtain an oxidized finish directly on nickel silver unless you first apply a deposit of copper or silver. The use of either copper or silver of course depends upon the type of finish desired.—T. H. C.

A-2.—If an oxidized finish on silver is desired it will be necessary to silver plate. Nickel silver will not oxidize directly.

Would be cheaper to black nickel plate the nickel silver directly which will give a black finish.

Black nickel formulas:

(1) Double Ni. salts	6 oz./gal.
Zinc sulfate	1 oz./gal.
Sodium sulfocyanate	2 oz./gal.
(2) Single Ni. salts	10 oz./gal.
Double Ni. salts	6 oz./gal.
Zinc sulfate	5 oz./gal.
Sodium sulfocyanate	2 oz./gal.

G. B. H. Jr., Problem 5,419.

Rheostat Switches

Q.—We are interested in electrical controls for our brass electroplating equipment. We are operating three brass electroplating barrels of the tilting type in which both the plated work and solution are emptied together. Each electroplating barrel draws from 75 to 160 amperes at 10 volts, depending upon the load inserted.

Now in considering the rheostats from various manufacturers, (200 amperes rheo.), we note the various type of switches offered. For example the knife switch, toggle joint switch, sliding contacts switch, etc.

Taking into consideration the corrosive conditions that exist in a plating room, and the usual intermittent service that such a switch gets under the above amperage, will you please discuss the advantage and disadvantage of these various switches, and suggest the type of switch, which you believe, will give us the best performance and accuracy under these electrical conditions.

A.—Rheostats equipped with either knife or latest design toggle switches should give satisfactory results. It is imperative, however, that all switch contacts should be coated with petrolatum to prevent corrosion. Petrolatum should be applied at least once a month. No type of switch can give satisfactory results that is badly corroded.

T. H. C., Problem 5,420.

Rust Proof Deposit

Q.—We are manufacturers of low priced line of steel bag frames and are desirous of information concerning a new rust proof deposit on steel to stand up in ordinary atmosphere from 6 to 8 months.

We are now depositing cyanide copper over steel, 15 min-

utes plate at 90 deg. F. Over the copper we deposit a 30 second flash of brass for desired finish. The next step the frames are dipped in transparent lacquer for tarnish prevention.

We will appreciate information if this method to your knowledge seems satisfactory for our purposes, or whatever other information you can give us.

A-1.—It is assumed that it is desired to maintain the brass finish mentioned and if this is so the procedure being followed is satisfactory for your purpose. It is suggested, however, that the temperature of the copper bath be increased to at least 110 deg. F. and the plating time to at least 30 minutes.

The lacquer used for a final protective coat should be of a grade and quality to give wearing qualities and excellent tarnish resistance.—T. H. C.

A-2.—No one can state positively how long a particular finish will stand up. The only way to tell this in the last analysis is by means of a service test, i.e. keep a record of some few frames that are in actual use. When the finish has been found that will provide satisfactory service then this finish can be maintained by means of thickness tests or salt spray tests. Thus if the desired finish will stand 48 hrs. in the salt spray then all work sent out of the plant should be sampled and tested for this corrosion resistance.

In general a 15 min. cyanide copper plus 15 sec. brass will in itself not provide much protection. The lacquer used will be of more value. Consult lacquer manufacturers and obtain a lacquer recommended for such service.

To obtain fair corrosion resistance would not advise anything under .0001" thickness of plate. Cannot tell whether 15 min. cyanide copper is giving this unless sample piece is examined.

G. B. H. Jr., Problem 5,421.

Satin Finish on Die Casting

Q.—The writer checked through several of your publications to try and discover a method of satin finishing an article die cast from a tin base metal, but did not find anything that seemed to fit.

We are expecting to have our server die cast and have been assured that the metal used will be non-corrosive, etc. so we believe a satin finish would be very satisfactory if not too expensive to apply.

We expect the metal to be largely a combination of tin and nickel and if you could advise us how the parts could be satin finished we would appreciate it.

A.—The method of satin finishing this type of article is to use a greaseless compound or a satin finish wire brush.

G. B. H. Jr., Problem 5,422.

Streaky Chromium

Q.—We are enclosing herewith three watch case tops which have been chrome plated. You will find that they are streaky in between the lugs. We are unable to determine the cause of this trouble and wonder whether you can be of any assistance to us.

We are also enclosing herewith three bezels that have not been chrome plated. The solution works well, seems to have good drawing power, and we do not have trouble with other work, but on this particular bezel, we are constantly bothered by streaks, such as you will note on the samples.

A.—The milky appearance of the chromium deposit such as shown on the area between the lugs on the watch case tops submitted, is due in most cases to an insufficient deposit of chromium. To correct this fault, the following conditions are necessary:

1. Correct composition of chromium plating bath.
2. Clean contacts; racks should be free of heavy deposits of chromium or nickel. Protective coating should be used on racks to prevent chromium or nickel deposits building up.
3. Correct design of racks to prevent shadowing of articles plated.
4. Acid pickle prior to final rinse before plating; a cold 10% to 15% muriatic or sulphuric acid solution should be used.

T. H. C., Problem 5,423.

Patents

A Review of Current United States Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,984,385. December 18, 1934. **Method of Making Composite Metal Bearing Plates.** Glenn L. Sherwood and Henry L. Johnson, Niles, Mich., assignors by mesne assignments, to The Cleveland Graphite Bronze Company, Cleveland, Ohio.

1,984,534. December 18, 1934. **Method of Cleaning Non-Ferrous Alloys.** Leonard O. Larsen, Downers Grove, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y.

1,984,745. December 18, 1934. **Electrodeposition of Zinc.** Karl Kaizik, Breslau, Germany, assignor to the firm Georg Von Giesche's Erben, Breslau, Germany.

1,984,899. December 18, 1934. **Apparatus for Use with Acid Cleaning Equipment.** Charles E. Smith, Creighton, Pa., assignor to Duplate Corporation, a corporation of Delaware.

1,985,142. December 18, 1934. **Welding Rod of Copper.** Oskar Brandenberger, Zurich, Switzerland.

1,985,308. December 25, 1934. **Electroplating of Articles with Chromium.** Oscar Bornhauser, Strasbourg (Bas-Rhin), France, assignor to Societe d'Electrochimie, d'Electrometallurgie et des Acieries Electriques d'Ugine, Paris, France, a corporation of France.

1,985,360. December 25, 1934. **Mold Forming Machine.** George F. Yager and Oliver J. Heath, Toledo, Ohio, assignors to The Bunting Brass and Bronze Company, Toledo, Ohio.

1,985,420. December 25, 1934. **Magnesium Base Alloy.** Roy E. Paine, Cleveland, Ohio, assignor, by mesne assignments, to Magnesium Development Corporation, a corporation of Delaware.

1,985,421. December 25, 1934. **Magnesium Base Alloy.** Roy E. Paine, Cleveland, Ohio, assignor, by mesne assignments, to Magnesium Development Corporation, a corporation of Delaware.

1,985,784. December 25, 1934. **Process for the Production of Aluminum-Plated Zinc Sheet.** Franz Jordan, Berlin-Charlottenburg, Germany.

1,985,814. December 25, 1934. **Copper Base Alloy.** Robert F. Bolam, Tampa, Fla.

1,985,900. January 1, 1935. **Composition for Preventing Silver from Tarnishing.** Israel S. Kleiner, Brooklyn, N. Y.

1,985,988. January 1, 1935. **Electroplating Machine.** Albert H. Hannon, Springfield, Ohio.

1,986,130. January 1, 1935. **Fabrication of Aluminum and Its Alloys.** Raymond T. Whitel, Massena, N. Y., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,986,197. January 1, 1935. **Metallic Composition.** William J. Harshaw, Shaker Heights, Ohio, assignor to The Harshaw Chemical Company, Cleveland, Ohio.

1,986,209. January 1, 1935. **Copper Alloy for Bearings.** Frederick J. Maas, Chicago, Ill., assignor of five per cent to Albert W. Langkau, five per cent to Adolph Kokoefer, and five per cent to Edward Csar, all of Chicago, Ill.

1,986,210. January 1, 1935. **Copper Alloy for Conducting Electricity.** Frederick J. Maas, Chicago, Ill., assignor of five per cent to Albert W. Langkau, five per cent to Adolph Kokoefer, and five per cent to Edward Csar, all of Chicago, Ill.

1,986,211. January 1, 1935. **Non-stanable Copper Alloy.** Frederick J. Maas, Chicago, Ill., assignor of five per cent to Albert W. Langkau, five per cent to Adolph Kokoefer, and five per cent to Edward Csar, all of Chicago, Ill.

1,986,544. January 1, 1935. **Die-Casting Machine.** Hans Theuer, Cologne-Braunsfeld, Germany, assignor to Eckert & Ziegler G. m. b. H., Cologne-Braunsfeld, Germany, a corporation of Germany.

1,986,585. January 1, 1935. **Nickel Alloy.** Wilhelm Kroll, Luxemburg, Luxemburg, assignor to Siemens & Halske, Aktiengesellschaft, Siemensstadt, near Berlin, Germany, a corporation of Germany.

1,986,303. January 1, 1935. **Method of Welding Copper.** Willis C. Swift, West Alexandria, Ohio, assignor to The American Brass Company, Waterbury, Conn.

1,986,704. January 1, 1935. **Protective Coating for Metals.** Bryant Bannister, Mount Lebanon, Pa.

1,986,825. January 8, 1935. **Free Cutting Alloy.** Louis W. Kempf and Walter A. Dean, Cleveland, Ohio, assignors to Aluminum Company of America, Pittsburgh, Pa.

1,986,826. January 8, 1935. **Free Cutting Alloy.** Howard L. Hopkins, Cleveland, Ohio, assignor to Aluminum Company of America, Pittsburgh, Pa.

1,986,827. January 8, 1935. **Free Cutting Alloy.** Howard L. Hopkins, Cleveland, Ohio, assignor to Aluminum Company of America, Pittsburgh, Pa.

1,986,828. January 8, 1935. **Free Cutting Alloy.** William L. Fink, Oakmont, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,986,833. January 8, 1935. **Manufacture of Tubes by the Push Bench Process.** Carl W. Littler, Pittsburgh, Pa.

1,986,936. January 8, 1935. **Polishing Composition.** William W. Lewers, Flint, Mich., assignor to E. I. du Pont de Nemours & Company, Wilmington, Del.

1,987,016. January 8, 1935. **Metal Spraying Device.** Rudolph Lensch and Paul Leder, Los Angeles, Calif.

1,987,451. January 8, 1935. **Precious Metal Alloy Composition.** Norris O. Taylor, Minneapolis, Minn., assignor to Spyco Smelting and Refining Company, Minneapolis, Minn.

1,987,452. January 8, 1935. **Precious Metal Alloy Composition.** Norris O. Taylor, Minneapolis, Minn., assignor to Spyco Smelting and Refining Company, Minneapolis, Minn.

1,987,576. January 8, 1935. **Method of Applying Coatings on Metals.** Kurt Moers, Charlottenburg, Germany, assignor to General Electric Company, a corporation of New York.

1,987,628. January 15, 1935. **Method of Manufacturing Non-Ferrous Alloy Sheets and Strips.** Samuel McMullan, Downers Grove, and Elmore Steele Strang, Oak Park, Ill., assignors to Western Electric Company, Incorporated, New York, N. Y.

1,987,629. January 15, 1935. **Process for the Production of Metallic Aluminum, or Aluminum Chloride and Certain Metals as By-Products.** Claude G. Miner, Berkeley, Calif., assignor of one-half to Dudley Baird.

1,987,639. January 15, 1935. **Leaded Brass and Process of Making It.** Robert T. Roberts, Riverside, Ill., assignor to Western Electric Company, Incorporated, New York, N. Y.

1,987,749. January 15, 1935. **Electro-Deposition of Tin.** Paul R. Pine, Elyria, Ohio, assignor to The Harshaw Chemical Company, Cleveland, Ohio.

1,987,980. January 15, 1935. **Lacquer.** Carl W. Sweitzer, Pittsburgh, Pa., assignor to Columbian Carbon Company, New York, N. Y., a corporation of Delaware, and Binney & Smith Company, New York.

1,988,010. January 15, 1935. **Solder.** Edward J. Kratz, Springdale, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,988,012. January 15, 1935. **Metal Deposits in Oxide Coatings.** Ralph Bryant Mason, New Kensington, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,988,040. January 15, 1935. **Process for the Treatment of Metals.** Edward Geisler Herbert, West Didsbury, Manchester, England.

1,988,153. January 15, 1935. **Alloy and Method of Making Same.** John Ward Bolton, Cincinnati, Ohio, assignor to The Lunkenheimer Company, Cincinnati, Ohio.

1,988,154. January 15, 1935. **Alloy.** John W. Bolton, Hamilton, and Sylvester A. Weigand, Cincinnati, Ohio, assignors to The Lunkenheimer Company, Cincinnati, Ohio, a corporation of Ohio.

1,988,425. January 15, 1935. **Mold.** David L. Summey, Waterbury, Conn.; The Colonial Trust Company and Richard P. Weeks Summey, executors of said David L. Summey, deceased, assignors to Scovill Manufacturing Company, Waterbury, Conn.

Equipment

New and Useful Devices, Metals, Machinery and Supplies

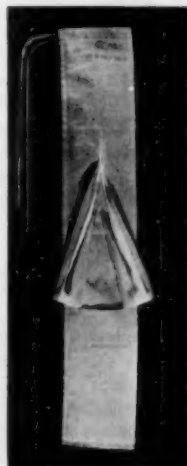
Filter Bags for Plating Solutions

Filter bags for anodes (Patent Pending), recently developed for Hanson-Van Winkle-Munning Co., Matawan, N. J., are an innovation in electro-plating equipment. They consist of two cloth bags, one fitting inside the other, with a layer of filter paper between.

In use, the anode is placed in the filter bag, then suspended in the plating tank in the usual manner. Sludge which ordinarily is released in the solution and which may cause rough and pitted deposits and that which settles to the bottom of the tank remains in the bag. When the anode has been used up, the filter bag is removed from the tank and discarded. Since no sludge gets into the tank the plating solution is kept at maximum efficiency at all times and heavy production schedules can be maintained without trouble.

When filter bags are used, filtering troubles are reduced to a minimum and the elimination of sludge makes it a very simple operation.

Hanson-Van Winkle-Munning filter bags are primarily for use with nickel



New Filter Bag

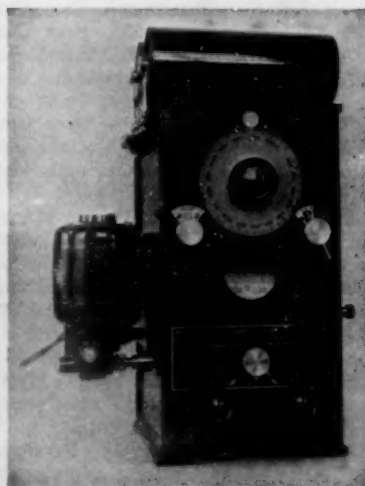
anodes of any type. Each bag will last as long as the anode, and the cost is negligible compared to the savings effected.

Improved Drive for Control-Pyrometer

For installations where their Potentiometer Control Pyrometers are to be used singly, The Foxboro Company, Foxboro, Mass., have developed an improved type of motor drive unit, called the "Type H." This drive comprises a ball bearing enclosed motor and a double worm and gear speed reducing system packed in lubricant.

In addition to its availability for single-controller installations this drive is amply powerful to operate one additional controller, through a coupling between the controllers. Although first quality construction is evident throughout the design and construction of this drive, it is offered at a considerable reduction in investment.

A new Bulletin No. 202 gives complete details regarding Foxboro Potentiometer Controllers and includes a description of this new drive unit for single controller installations. Copy will be sent on request.



Motor Driven Potentiometer Controller

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Air Operated Controllers for Temperature, Flow, Pressure and Liquid Level. Brown Instrument Company, Phila., Pa.

Triple Life. A surface coating for paint, varnish, lacquer, metal (brass, copper, bronze, etc.) can be applied by spraygun, soft cloth or lamb's wool applicator. Said to prevent oxidation.

Parade of Industries to Feature Oakite Booth

Dramatically visualizing the marked progress made in production metal cleaning during the last few years, a unique display in motion called "A Parade of Industries," will feature the booth of Oakite Products, Inc., 22 Thames Street, New York, at the Machine Tool Exposition.

Hundreds of miniature models of a wide variety of products, produced on machine tools and which require several or more cleaning operations before the product is finally completed, will be seen in "The Parade of Industries." At the same time there will be pictorially illustrated various types of cleaning operations, together with the newest developments in Oakite cleaning materials and methods that today are helping manufacturing executives meet today's production requirements. In addition, there will be shown a graphic illustration of the need for using up-to-date methods of assuring proper temperature and solution control of cleaning tanks, indicating the importance of these factors in affecting results in operations such as cleaning before plating, enameling, japanning, etc.

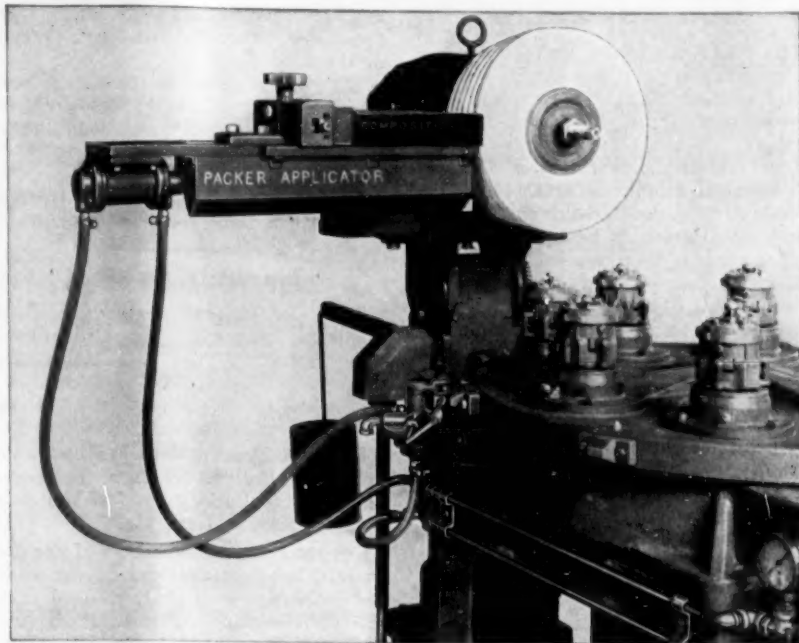
In attendance at the Oakite booth No. A103 will be H. J. Douglas, Executive Vice President of Oakite Products, Inc.; J. C. Leonard, Chicago Div. Mgr.; J. C. Maguire, Detroit Div. Mgr.; A. H. Green, C. A. Peterson, L. D. Dunn, J. A. Carter, Assistant Sales Mgr., Carl Johnson, Technical Director, Arthur Kopp, Exhibit Dept.

Buffing Composition Applicator

Packer Machine Company, of Meriden, Conn., has placed on the market an automatic applicator for feeding composition to the buffing wheels of the Packer automatic polishing and buffing machines.

The new applicator can be used on both the rotary type automatic and the new conveyor (straight line) type machine.

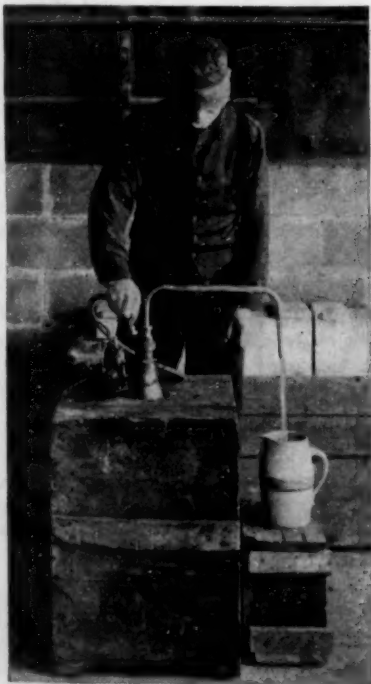
Patents are pending. A folder available on request gives the specifications and features of this new applicator.



Applicator Attached to Packer No. 1 Rotary

Acid Ejector

The Lea acid ejector is a safety device for emptying acids or other liquids from carboys. It does away completely with tilters, cradles, blocks, etc. Its purpose is to prevent nicked and broken carboys and the destruction of containers by the acids. Additional savings are



Lea Acid Ejector

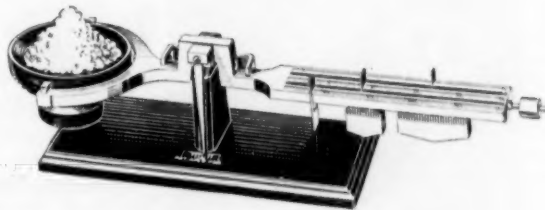
effected by prevention of floor destruction; ease of indoor storage; lowering insurance rates, etc.

The Lea Manufacturing Company of Waterbury, Conn., are the sole distributors.

New Laboratory Balance

The Bennett Balance, sold by the Chemical Polishing Company of New York, 175 Fifth Avenue, is a very compact little scale, made of black bakelite and light alloy beam, with an alloy steel knife edge; no springs or joints and no loose weights that are so easily lost; and is said to be sensitive to a hundredth of a gram.

It sells at a very low price.



Bennett Balance

New Spot Welders

The Pier Equipment Manufacturing Company, 1310 Milton Street, Benton Harbor, Michigan, recently announced a new line of electric spot welders. These welders are smaller than most conventional types of welders heretofore on the

market but are designed to handle welds on from 16 to 26 gauge steel in continuous production. It is claimed that manufacturers fabricating metals can effect substantial savings in time and labor through using several of these units and thereby effect more efficient, progressive production.

In addition to filling a definite need in manufacturing establishments, it is claimed that these welders will prove invaluable in any sheet metal, sign, or job shop—any shop fabricating metals and wires that is interested in eliminating bolts, rivets, and in saving labor.

These welders are available in three sizes. The No. 40 ACE Welder is priced at only \$35.00 complete with foot pedal control and stand. The No. 50 ACE Spot Welder for 220 V 60 C will handle up to 1200 welds per hour on 24 gauge steel, yet it is priced at only \$47.50 complete with foot pedal control stand. Detailed literature on this equipment may be obtained from the manufacturers whose address is given above.



Ace Spot Welder

Metallic Coatings

The American Solder and Flux Company, Wayne Avenue and Berkley Street, Philadelphia, Pa., announce an improvement in their Amco metallic coatings.

This material was formerly supplied as a separate metal and flux. It is now furnished in a powdered form that requires only water to be mixed with it. The solution is then applied to the surface to be coated and heated to the melting point of the coating which runs from 356° F. to 500° F., depending upon the type of coating used. These types include zinc, tin and lead.

Amco Metallic Coating is recommended for touching up spots that have not been properly coated, or where welding or brazing has burned the original coating away. The operations are said to be simple consisting only of cleaning the surface to be coated and applying any of the various brands of coatings, either mixed with water or in powdered form.

New Finish to Give Color Match

The Porcelain Enamel & Manufacturing Company of Baltimore, Maryland, manufacturers of porcelain enamels, oxides, opacifiers and cleaners, announce a new series of, lead-free cast iron enamels, which are a perfect match in whiteness for sheet iron enamels.

There has always been a distinct difference between the shades of white for porcelain enamels fabricated for cast and sheet iron. These new enamels, it is said, are more workable than the old lead-bearing types as they require no special treatment. This enamel frit has been developed from a series of leadless enamels which have been produced exclusively by Pemco for the last eight years. It is stated that manufacturers using porcelain enamel in the production of their products will find this new enamel of decided advantage in eliminating the difficulties often encountered where the finished cast and sheet iron pieces do not match in color.

Improved Stop-Off Lacquer for Chromium Plating

The Research Laboratories of United Chromium, Inc., 51 East 42nd Street, New York City, have developed a new stop-off lacquer, "Unichrome Resist," for use in chromium plating. It is claimed by the engineers of this company that this new stop-off lacquer possesses the following ideal properties to a higher degree than any other lacquer with which they are familiar:

- (1) An excellent insulator from an electrical standpoint.
- (2) Resistant to the chemical action of the various acids and rinse waters used in the cleaning and plating operations.
- (3) Flows readily, air-drys quickly, and has good adhesive properties. Reasonably tough and ductile in addition.
- (4) Readily removable by means of

a solvent, when necessary, and readily applicable either by brushing, spraying or dipping.

(5) When in contact with the chromium plating solution, does not yield any products which might contaminate the solution.

(6) Non-toxic.

This new product is in actual plating service in a large number of plants.

Korolac Exhibit

The Korolac exhibit of The B. F. Goodrich Company, Akron, Ohio, proved

to be one of the attractions at the recent Electro-Platers' convention in Bridgeport. Prior to the meeting, much interest had been evidenced throughout the industry in this new synthetic rubber-like material as a corrosion resisting coating for plating racks, and members were given a first-hand opportunity to observe the product and its application. Daily demonstrations were given which included the actual dipping of miniature plating racks, enabling spectators to view the various steps in the operation. These racks were distributed as souvenirs and were in great demand.

Catalogs

Business Opportunities in Patents and Formulae. Bulletin No. 26 of the Kansas City Testing Laboratory, 700 Baltimore Avenue, Kansas City, Mo. (414)

Copper Data. A collection of the generalized information about copper which the ordinary user is likely to need. Copper Development Association, Thames House, Millbank, London, S. W. 1, England. (415)

Spray Painting Catalog. A new, revised 16 page, loose-leaf catalogue on spray painting equipment and accessories. A great deal of technical information and many recommendations are included. Binks Manufacturing Company, 3114 Carroll Avenue, Chicago, Ill. (416)

Here's How Wyandotte Is Used. A new tabloid newspaper in the interest of Wyandotte products. The J. B. Ford Company, Wyandotte, Mich. (417)

Rotoblast. Modern airless blast cleaning. Pangborn Corporation, Hagerstown, Md. (418)

Industrial Thermometers. Catalogue No. 1125. Issued by the C. J. Tagliabue Manufacturing Company, Park and Nostrand Avenue, Brooklyn, N. Y. (419)

Dowmetal. Properties, shop practice, specifications and availability. A very valuable compendium of information on this magnesium alloy. Price \$1. The Dow Chemical Company, Midland, Mich. (420)

Barriers to Industrial Waste. Insulat-

ing materials. Johns-Manville, 22 East 40th Street, New York. (421)

Pul-Lift. A new hoist with capacities from ¾ ton to 6 tons. Yale & Towne Manufacturing Company, Philadelphia Division, Philadelphia, Pa. (422)

Abrasive Cut-Off Wheels. Norton Company, Worcester, Mass. (423)

Rapid Core Machines. American Foundry Equipment Company, Mishawaka, Ind. (424)

How Equipment Manufacturers Provide Against Inadequate Specifications in Customers' Orders. Policyholders' Service Bureau, Group Insurance Division, Metropolitan Life Insurance Company, No. 1 Madison Avenue, New York. (425)

Automatic Electric Starters. Bulletin 709. Allen Bradley Company, 1326 South Second St., Milwaukee, Wis. (426)

Specially Tooled Semi-Automatic Engine Lathe. Monarch Machine Tool Company, Sidney, Ohio. (427)

Diaphragm Pump for Difficult Jobs. Handling corrosive, abrasive, viscous, valuable and easily contaminated materials. T. Shriver & Company, Harrison, N. J. (428)

Sound Control of Mechanical Equipment. Johns-Manville, 22 East 40th St., New York. (429)

Paper Insulated Cable. General Electric Company, Schenectady, N. Y. (430)

Save time. Use the coupon below to get any of the above catalogs or bulletins, or for data on any subject not mentioned this month. METAL INDUSTRY will see that you get them promptly.

METAL INDUSTRY

116 John Street, New York.

(Insert below the number in parentheses at end of each item desired.)

I wish to receive the following catalogs mentioned in September, 1935

.....

Name Address

Associations and Societies

Machine Tool Exhibit

The National Machine Tool Congress will hold its 1935 meeting at Cleveland, Ohio, at the Auditorium, September 11-21. An exhibit of all types of machine tools and labor-saving devices will be the feature of the meeting. Technical sessions will be held from Wednesday, September 11 to Friday, September 20.

Some of the leading industrial and technical men of the United States will address the meetings.

American Welding Society

Headquarters, 29 W. 39th Street,
New York

The 15th annual meeting of the American Welding Society will be held September 30-October 4 at the Palmer House, Chicago, Ill.

Among the papers to be read at this meeting will be "Resistance Welding of Copper Alloys" by I. T. Hook, American Brass Company, Waterbury, Conn.

Full details can be obtained from the headquarters of the Society.

Battery Manufacturers Association

7 E. 44TH ST., NEW YORK

The Board of Directors of the National Battery Manufacturers' Association, Inc. held a meeting at the Hollenden Hotel in Cleveland, Ohio, July 9, 1935, at which time it was decided to hold the Annual Fall Convention in Chicago sometime between October 1 and 15, the exact dates to be announced later. All members of the Industry will be invited to attend.

Master Electro-Platers Institute

7320 Hamilton Avenue, Detroit, Mich.

The new Mid-West Association of the Master Electro-Platers Institute is increasing in membership, services and activities. A branch of the Master Electro-Platers Institute of the U. S., this association covers a large number of job-shop owners in Ohio, Michigan, and Indiana and neighboring areas. Its program calls for a quarterly general meeting and monthly meetings of its local groups.

The next quarterly meeting will be held at Beatley's Hotel, Russel's Point, Indian Lake, Ohio, on September 14-15. An excellent series of discussions by authorities on topics of greatest concern to job platers will augment the interesting business of adopting the details of the fall program and policies.

"We look for the greatest gathering of plating shop owners that we have ever had in the Mid-West," commented **Henderson Bell**, President of the Association. "Immediately following the General Meeting each local group will

participate in four local monthly meetings and intensive field service designed to deal with the most difficult problems confronting the membership in each area. In December we will have another General Meeting at which plans will be laid for the coming period."

Newark Branch, A. E. S.

c/o George Reuter, 784 Prospect St.,
Maplewood, N. J.

The annual Clambake and Outing of the Newark Branch of the American Electro-Platers' Society will be held on Saturday, September 21 at the Old Cider

Mill Grove, Vauxhall Road, Union, N. J.

Full information can be obtained from George Reuter, Secretary at the address given above.

Electrochemical Society

Headquarters, Columbia University,
New York.

The Fall 1935 meeting will be held in Washington, D. C., October 10-12. A feature of this meeting will be the session on metal plating and refining, to be held on Saturday, October 12. **William McCord** will preside as chairman of the Electrodeposition Division. Manuscripts received to date cover the deposition of tin, copper, chromium, sodium, nickel, cobalt and copper.

Personals

R. L. Hallett

R. L. Hallett of the National Lead Company, Brooklyn, N. Y., was recently elected a member of the Executive Committee of the American Society for Testing Materials.

After receiving his E.M. degree from Colorado School of Mines in 1905, Mr. Hallett was a chemist at the Selby Smelting & Lead Company, and Von Schulz and Low, Denver, Colorado. He then became chemist and mining engineer of the Consolidated Arizona Smelting Company, and for a number of years has been with the National Lead Co., Brooklyn. Mr. Hallett has been active in A.S.T.M. work for many years and recently headed the special committee in charge of the Sym-

pany, 167-171 North May Street, Chicago, Illinois. The Clinton Company



R. J. HAZUCHA

manufacture industrial finishes and specialties.

American Foundry Equipment Company, 555 Byrkit Street, Mishawaka, Indiana, has appointed **Martin H. Kidder** as their Industrial Relations Director, to serve industrial and product engineers in the application of the Wheelabrator — the airless abrasive cleaning method—to their problems.

William Gaunt, Jr., formerly with the Hartford Screw Machine Company has become connected with Becton Dickinson & Company, Rutherford, N. J. in charge of metal finishing.

Benjamin Josephs, Treasurer of the A. A. Brunell Electroplating Corporation, Worcester, Mass., has severed his connection as of August 31.

Mr. Josephs has been a well-known figure in the electroplating industry. He came to the Brunell Corporation in January, 1933. Since that time the corporation has moved to larger and better quarters, maintained and strengthened its position as one of the large and well-equipped shops of New England. Shortly after entering the plating industry Mr. Josephs became one of the prime movers in organizing the Electro-Platers



R. L. HALLETT

posium on Paint and Paint Materials held at the 1935 regional meeting. He is a member of the A.I.M.E., American Chemical Society, and the Mining and Metallurgical Society of America.

R. J. Hazucha, formerly connected with Ault & Wiborg Corporation as well as the Maas & Waldstein Co. and for many years identified with the plating and finishing industry, has joined the selling organization of **The Clinton Com-**

Association of Worcester, which later grew to become the Master Electro-Platers' Institute of New England, of which he is now President. Mr. Josephs' wide acquaintance and his tireless activity in behalf of the industry have

placed him high in the confidence of electroplaters throughout the country.

Mr. Josephs' plans for the future have not yet been announced, but we sincerely hope that he will keep his contacts in the electroplating industry.

Obituaries

R. M. McCandlish

R. M. McCandlish, President and General Manager of the Bar-Rusto Plating Corporation, Kansas City, Missouri, died August 18 at the age of 55.

Mr. McCandlish was born in Omaha, Nebraska. He was educated in the public schools and the University of Nebraska and then entered into the refrigeration engineering business at Lincoln, Nebraska, and in 1910 he organized the McCandlish Engineering Company, in Kansas City, designing and building ice plants, including the Alpine Ice Company, of which he was vice-president and manager, until 1927 when he organized the Bar-Rusto Plating Corp., pioneering Udylite cadmium and chromium plating in the southwest terri-

tory as well as other metal finishing processes.

Mr. McCandlish was a most capable manager and executive and was held in high esteem by every one who knew him. He is survived by his wife, a brother and sister, two sons and a daughter.

William M. Shakespeare

William M. Shakespeare, for the last five years engaged in research at Perth Amboy, N. J., for the Anaconda Copper Company, died August 19th, of a heart attack while hiking with his two sons in the White Mountains, near Gorham, N. H. He was fifty-one years old.

Mr. Shakespeare had been with the Anaconda Copper Company since 1924,

when he became manager of the firm's roofing department. Since 1930 he had devoted himself to supervising the perfection of a new process for the thin-sheet copper.

Surviving are his wife, Mrs. Margaret Pratt Shakespeare, and two sons, William and George Shakespeare. He was a member of the Delta Kappa Epsilon and of the Willard Straight Post, American Legion, of New York City.

J. L. Oberdorfer

Jesse L. Oberdorfer, aged 60, died suddenly at his home in Syracuse, N. Y., August 19th. Mr. Oberdorfer was formerly treasurer of the M. L. Oberdorfer Brass Company of Syracuse.

Mr. Oberdorfer was born in Syracuse, and after his education in the Syracuse public schools and Meade Business College, became associated with his father in the brass company.

Mr. Oberdorfer was prominent in social and civic work. He was a member of a number of clubs and active on various Liberty Loan and Red Cross Committees during the war.

Industrial and Financial News

Metal Developments

The Foundry Equipment Manufacturers Association reports that the index from that quarter for June was 100.1 which compares with 100.7 for May, 1935, and 704 for June, 1934. Shipments for June, 1935, showed an index of 82.2 compared to 67.0 for May, 1935, and 64.3 for June, 1934. Unfilled orders were 135.6 in June, 1935, as against 117.7 in May, and 57.8 for June, 1934.

A burial urn of the Bronze Age, probably more than 3,000 years old, was dug up recently at Dudsbury on the outskirts of Bournemouth, England. The imprints of the potter's fingernail on the rim seems to point to the fact that a clay mold was used.

In a recent monograph in "Science," Dr. C. G. Fink, Columbia University, described a new method of recovering gold from solutions of very low concentration like sea water, by the use of a cathod rotating at very high speed. Dr. Fink suggests, according to an item in the daily press, that ocean liner propellers may some day be used for this purpose.

Secretary of the Treasury Morgenthau recently announced that with the approval of the President, he would recommend to Congress the issuance of two new coins, a ½¢ piece of copper and a 1 mill (1/10 of a cent) piece of aluminum.

Announcement has been made of the invention of a process for coating steel sheets with aluminum by Dr. C. G. Fink, Columbia University. Much of the interest in this new material is based on the possibility of using it instead of

tin plate for cans and other food containers.

The General Electric Company has organized a separate company known as Houses, Inc., to co-operate in the development of houses of any type which seem worthy and promising, to conduct research work, and to assist in the management and financing of such enterprises. The company will not itself engage in the construction or sale of houses.

Pewter craft work has become extremely popular among the summer camps for boys and girls, who are being taught to make a wide variety of useful articles in this easily workable material.

The auditorium at the Metal Products Exhibits, Inc., International Building, Rockefeller Center, New York, to be opened in September, will be utilized during the coming year for meetings of a number of technical and commercial societies interested in industrial materials. Requests for reservations are now being considered as Metal Products Exhibits, Inc. is offering its facilities for the holding of meetings, free of charge, to organizations of appropriate character.

"A million pounds of copper and copper alloys are being consumed each week by the mechanical refrigeration and air conditioning industries," Bertram B. Caddle, Secretary of the Copper & Brass Research Association of New York, announced recently. "According to present consumption and taking any seasonal

slump into consideration, Mr. Caddle continued, "the total tonnage for the year should exceed 50,000,000 pounds.

The International Nickel Company has raised its quarterly dividend from 15 cents to 20 cents per share of common stock. Let us hope that this is true index of the times.

David E. Anderson, chief engineer of the Bohn Aluminum and Brass Corporation, has recently conducted a study of aluminum cylinder heads of modern design, which, it is stated, resulted in important structural as well as thermal improvements. Mr. Anderson reported in part that "the tendency for engineers to skimp on material in the cylinder head in order to save weight, which characterized certain designs in 1933 and 1934, has been reversed this year due to a greater knowledge of the advantages of properly sectioning the heads. While the cylinder head is theoretically not subject to important dynamic stresses, it is essential that the material used, both as regards quantity and disposition, meet certain standards of rigidity and strength not only to maintain the integrity of the cylinder head gasket but also of the head itself."

The best known weapon against Termites is the placing of copper or copper alloy shields between the foundation walls and the superimposed woodwork of buildings, according to the Copper & Brass Research Association of New York. Literature on the control of Termites can be obtained from the Department of Agriculture, Washington, D. C. (Bulletin 101).

The Franklin Metal Plating Company,

630 South Sixth Street, Columbus, O., has been in the Zang family for four generations. Charles Zang who now heads the business inherited it from his father who got it from his father. Three of Charles Zang's six sons are now in the business and his grandson, Jerry Zang, aged 4 is now beginning to take an interest in the shop. Long may they wave!

The **E. H. Edwards Company**, Chicago, has recently adopted a new metal bag for Edwards Metal-Pakt Marshmallows. The bag of Reynolds Metal, manufactured by **Reynolds Metals Company**, New York, presents a striking appearance, being printed in an all-over design of white marshmallows on a brilliant blue and silver background.

According to reports in the daily press, the **Maytag Company**, manufacturers of washing machines in Newton, Iowa, have increased production from 5 eight-hour shifts per week to 6 nine-hour shifts. An extra shift is contemplated.

Permanent Metal Product Exhibition Ready to Open September 16

When the first section of the permanent Metal Products Exhibits is open to the public on September 16 in the International Building, Rockefeller Center, New York, special exhibitions will be on view in addition to the regular displays of metal and plastic materials and parts as used by the industry.

Metals and other materials, styled in the modern manner for both technical and consumer products, will be featured in a joint exhibition by a group of world-famous industrial designers. The designers participating are Gilbert Rohde, Lurelle Guild, Henry Dreyfuss, Walter Dorwin Teague, Russell Wright, Egmont Arens, Norman Bel Geddes, Donald Deskey, Raymond Loewy, George Sakier, and Walter Von Nessen.

A comprehensive exhibition of metal finishes is being installed under the direction of Adolph Bregman, Managing Editor of **Metal Industry**. This exhibition will include electroplates of a wide variety of metals, colored and chemical finishes for aluminum, silver, gold, etc., lacquers and lacquer enamels, and product sequences showing each step in the metal finishing process.

A display of plastics, being assembled under the direction of C. A. Breskin, publisher of "Modern Plastics," will consist of a wide variety of molded and cast synthetics as supplied by the leading manufacturers.

In the Auditorium of the Exhibit, a meeting will be held on September 17 by the National Management Council. The subject for this meeting, for which arrangements were made by the Association of Consulting Management Engineers, will be "High Lights of the Sixth International Congress for Scientific Management, held in London, England, July, 1935." Speakers include Harry Arthur Hopf, Chairman of the

American Delegates to this meeting, and Lillian M. Gilbreth and William H. Gesell, delegates.

Practical Electroplating Course

Dr. C. B. F. Young, Technical Director of the U. S. Research Corporation, Long Island City, N. Y., and Director of Research at the Biolite Corporation, New York, N. Y., will give a course in Practical Chemistry and Practical Electroplating at Columbia University, New York City.

The course will be divided into two semesters, both consisting of two 3-hour sessions per week.

Handy and Harman Erect Plant in Canada

The well known New York firm of Handy & Harman, dealers, manufacturers and refiners of precious metals are building a new plant in Toronto. It will be operated by Handy & Harman of Canada, Limited, a subsidiary company and will be located at 141 John Street in Toronto. The new plant will be equipped to carry on all operations now performed at the main plant in Bridgeport.

The company has long been recognized as a leader in silver and gold metallurgy having carried on extensive research work for a long period of years in improving the working qualities of precious metals for use in the arts and industries. Notable among their products are "Sil-Fos" and "Easy-Flo" brazing alloys, "Handy" Silver Solders and "Handy Flux," which are widely used in many fields including electrical, chemical and refrigerating work where both ferrous and non-ferrous metals are joined.

The principal business of the firm is the melting, rolling, alloying and refining of gold and silver for the arts and industries. Most of the Sterling silver used by American silverware manufacturers is produced by Handy & Harman. They also supply silver

In the opening semester, the first hour will be devoted to a study of the modern theories of applied chemistry. The remaining two hours will be spent in the laboratory, where the students will perform their own experiments. This course is designed to give the plant man a thorough knowledge of inorganic chemistry.

In the closing semester, the first hour will be given over to a lecture concerning the application of modern theories of electrochemistry to electroplating. The balance of the period will be spent in laboratory, where the students will perform experiments on electroplating baths. All electroplaters, buffers and plant men are invited to take this course.

and gold anodes for plating. "Specially Refined" silver for alloying, silver for chemical uses and silver or alloys of silver for use in the electrical industry; silver and gold wire and special forms as well as karat gold in various compositions and colors including gold solders.

Handy & Harman were established in New York more than 68 years ago, while one of its subsidiaries has been in operation for 98 years. For more than a half century, the firm has quoted the New York Official price for silver which is used as the rate for settlement between smelters and miners, and as a basis for international transactions. They are recognized as an international authority on silver and for their dealings with London and Far Eastern markets.

The products of Handy & Harman have long been widely known in Canada. They have supplied gold and silver in a variety of forms and handled the refining of precious metal scrap and waste material for many firms some of which have been served for over a half century. The new facilities of the Toronto Plant, it is believed, will fill a long felt need of Canadian manufacturers since no other establishment exists in Canada with the same equipment.

Business Items-Verified

Harold L. Ebberts and Milton L. Snyder announces the dissolution on July 31, 1935, of their general partnership conducted under the name and style of **Acme Metal Etching Company**, and announces the formation on August 1, 1935, of a limited partnership under the name and style of **Acme Metal Etching Company** to conduct the business formerly carried on by the general partnership with Harold L. Ebberts, general partner, Milton L. Snyder, limited partner, 4887 St. Aubin Avenue, Detroit, Mich.

McCallum-Hatch Bronze Company, Buffalo, N. Y., reports that the damage

resulting from a fire in a foundry adjoining the above plant, was of a minor nature, and did not necessitate any interruption in their operations. The firm operates a bronze, brass and aluminum foundry.

Standard Sanitary & Manufacturing Company, 2801 Preble Avenue, N. Pittsburgh, Pa., re-opened on July 8, after being idle for three years.

A. Kenneth Graham and Associates, Jenkintown, Pa., have been organized as chemical engineers and consultants. They offer a cooperative service for research, development and the establishment and maintenance of the new speci-

fications for plated coatings. Their experience covers all phases of metal finishing and rust proofing as well as the manufacture and use of phosphoric acid, phosphates, organic chemical and petroleum products.

Rock City Foundry, Wabash, Ind., has recently been organized by R. M. Stauffer, L. Habitch, and E. F. Matern.

Dearborn Brass Company, Cedar Rapids, Iowa, manufacturers of plumbing specialties, have rebuilt their factory which was recently damaged by fire, and are now operating on a normal schedule. The company operates the following departments: brass, bronze and aluminum foundry; brass machine shop; tool room; plating shop; polishing room.

Gilbert Brass Foundry Company, St. Louis, Mo., has acquired a factory on Farlin Avenue, at a cost of \$25,000. The company operates the following departments: brass, bronze and aluminum foundry; brass machine shop; tool room; smelting and refining department.

H. J. Wandtke Pattern Works have moved their office and plant from 518 West 11th Street, Anderson, Ind., to West 14th Street and Big Four Railroad, in the same city. The name has been changed to **Central Pattern & Foundry Company**. They will manufacture wood and metal patterns and aluminum alloy castings.

U. S. Graphite Company, Saginaw, Mich., plans to construct a one-story, 68 x 120 foot addition to its plant. Estimated cost \$28,000, including equipment.

The Hookless Fastener Company, Meadville, Pa., has begun manufacturing operations in its Erie, Pa., plant. More than 100 employees are on the payroll.

Advertising Novelty Manufacturing Company, 1207 Race Street, Philadelphia, has leased a floor, about 5,000 square feet, at 13th and Wood Streets, Philadelphia, for a new plant. This company manufactures metal and other advertising specialties.

Kalamazoo Stove Company, Kalamazoo, Mich., is building an addition to its foundry, 90 x 250 feet, which will increase their production about 50 per cent.

Clarence G. Backus who has been identified with the plating and polishing industry for a great many years, has been appointed District Manager of Munning & Munning, Inc., Newark, N. J., with headquarters at the New York Office of the Company, 24 State Street, New York City.

On September 1, the offices of the **Taunton-New Bedford Division of Revere Copper and Brass Incorporated** will be removed from Taunton, Mass. to New Bedford, Mass., where Revere's principal New England mill is located. Mill operations will be continued, however, in Taunton, and a warehouse will also be maintained there. **R. G. Scott**,

Vice President in charge of this division, states that the move is being made in the interest of better service to Revere customers.

The Foxboro Company, Foxboro, Massachusetts, will exhibit a complete line of indicating, recording, and controlling instruments for the steel industry at the Iron & Steel Exposition being held in the William Penn Hotel, Pittsburgh during September. Features of the Foxboro exhibit will be complete gas producer control instrumentation, the Potentiometer Stabilog, and the Cupola Air-Weight Controller. The Automatic Potentiometer Pyrometer Controller with the new Type H Drive and numerous other instruments will also be on display. This exhibit will be located in Hall No. 2—Booth No. 91 and will be under the direction of **A. E. Shafer**, Pittsburgh Branch Manager, assisted by **H. L. Lee**.

Rise in Secondary Metals Recovery in 1934

Value of secondary non-ferrous metals recovered reported to the Bureau of Mines was \$127,286,100 in 1934, compared with \$101,268,800 in the year previous. The increase in value resulted largely from higher prices for copper, zinc, tin, and antimony.

The total tonnage reported to the Bureau was 740,400 short tons in 1934, against 721,950 in 1933. The year witnessed increased production of secondary copper, tin, aluminum, and antimony.

City collections of scrap metals were good, but shipments from rural areas were below normal.

Secondary Metals Recovered in the United States

	1933		1934	
	Tons	Value	Tons	Value
Copper, including that in alloys other than brass	247,100	\$31,628,800	292,500	\$46,800,000
Brass scrap re-treated	130,000	14,378,000	121,300	16,078,000
Lead as metal	131,800	16,613,000	124,510	15,421,600
Lead in alloys	92,700		83,900	
Zinc as metal	48,100	4,678,800	29,300	3,225,000
Zinc in alloys other than brass ..	7,600		8,200	
Tin as metal	7,250	16,508,700	8,250	25,487,600
Tin in alloys and chemical compounds	14,850		16,650	
Aluminum as metal	14,500	15,343,000	21,000	17,632,000
Aluminum in alloys	19,000		25,400	
Antimony as metal and in alloys ..	7,400	963,500	7,550	1,346,900
Nickel as metal	300		550	
Nickel in non-ferrous alloys and salts	1,350	1,155,000		1,295,000
	721,950	\$101,268,800	740,400	\$127,286,100

Corporation Earnings

Net Profit unless followed by (L) which is loss

	First Half	
	1935	1934
Advance Aluminum Castings Corporation	26,787	2,299
Anaconda Copper Mining Company	5,214,883	2,986,497
Anaconda Wire & Cable Company	468,137	516,814
Club Aluminum Utensil Company (Year ended June 30th)	12,242(L)	1,201
International Nickel Company	10,338,242	10,012,642
International Silver Company	336,757(L)	16,492
National Enameling and Stamping Company	94,011	210,889
New Jersey Zinc Company	2,174,213	2,086,551
Phelps Dodge Corporation	2,624,697	2,067,795
Revere Copper & Brass, Inc.	513,598	968,576
Reynolds Metals Company	562,309	921,366
St. Joseph Lead Company	78,398(L)	186,662(L)
Vulcan Detinning Company	140,253	158,259
Yale & Towne Manufacturing Company	61,838	62,265

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

September 3, 1935.

Officials of the **Chase Companies, Inc.** state that their company has not acquired 51 per cent of the stock of the **Mueller Brass Co.** of Detroit as reported last week. It is understood that negotiations were carried on for some time but have now been dropped and that the Detroit company has made arrangements with New York bankers to refund the remainder of the company's bond issue amounting to \$650,000 and bearing 7 per cent interest with new bonds carrying a rate of 5 per cent.

The **Waterbury Tool Company**, recently acquired by the **Sperry Corporation** of New York has enjoyed such an increase in business in recent months that it has now started construction of an additional factory building having 10,000 square feet of floor space and costing about \$40,000. This will increase its capacity 30 per cent. The concern makes high precision variable speed transmission gears and employs about 150 hands which will be increased when the addition is finished and equipped. Machinery to be installed will cost about \$20,000.

The **American Federation of Labor** has sent an organizer here to form a union for the unskilled brass workers. Meetings have been held weekly but no charter has yet been secured. The organizer is also attempting to form a union of button workers.

John H. Goss, vice president of the **Scovill Manufacturing Company**, who is chairman of the state committee arranging for an exhibit of brass and non-ferrous goods in Hartford this month in connection with the state's 300th anniversary, has appointed an executive committee to assist in the latter movement. They are **John A. Coe**, president of the **American Brass Company**, **Frederick S. Chase**, president of the **Chase Companies, Inc.**, and **Howard Hart** of the **Platt Brothers Company**. Among the group leaders in the county are **Levi Wilcox** of **Apothecaries Hall Company** and **Howard H. Bristol** of the **Bristol Company**.

Dudley S. Ingraham of the **Ingraham Clock Company** of Bristol is chairman of the group planning the clock exhibit. He has appointed as assistants, **C. H. Granger** of the **Waterbury Clock Company**, **Benjamin Ozaross** of the **Benrus Clock Company** and **Fred Lux** of the **Lux Clock Company**, all of this city. **Roy C. Wilcox** of the **International Silver Company** of Meriden is a member of the general committee. The exposition, which will include exhibits of all the industries of the state is expected to be the most outstanding thing

of its kind in the history of the country.

The **Waterbury Farrel Foundry Company** has received a large order from the **Amtorg Trading Company** for export to Russia. **D. C. Griggs**, president of the company, says it has been making machinery for export to Russia for some time and that apparently the orders will continue for some time.

Charles E. Beardsley of this city, formerly president of the **Beardsley & Wolcott Manufacturing Company** of this city and at one time president of the **Bridgeport Brass Company**, has been appointed assistant administrator of the **WPA** for this state.

The **Chase Companies, Inc.** last month gave a free outing in Middlebury to all the employees with long service records, numbering about 250. The events included field sports and a barbecue.—**W. R. B.**

Connecticut Notes

September 3, 1935.

BRIDGEPORT — The **American Chain Company** is entitled to recover from the United States government, \$600,136 plus interest and court costs in a decision given last month by **Judge E. S. Thomas** of the U. S. District court. The amount represents manufacturers' excise taxes paid from 1922 to 1924. The case was heard several years ago by the District court and then went to the Circuit Court of Appeals and finally to the Supreme court which sent it back to the District court.

Walter B. Lashar, president of the **American Chain Company**, has been elected chairman of the board of the First National bank.

Employees of the **Bryant Electric Company** and the **Hemco Moulding Company** have been granted a 5 per cent wage increase making an increase of \$50,000 in the annual payroll. Working hours will be increased from 36 to 40 shortly.

Press reports that **Remington Arms, Inc.** is testing a new metal are denied by **Mr. Hadley**, engineer in charge of development. He admitted conversations had been held with **Juan Gonzales**, a Mexican metallurgist, who is reported to have devised a new metal alloy. According to the earlier reports the company was making tests of this alloy for the U. S. Ordnance Department.

Over 700 distributors of **General Electric** products were entertained at the plant here last month. **W. Clark Stewart**, works manager, announced that the company's payroll in this city will amount to over \$3,500,000 this year. **Charles E. Wilson**, vice-president, said the company is investing much money

in preparation for the coming of television as a commercial product.

HARTFORD—The meeting of the **Billings & Spencer Company** stockholders, scheduled for last month, has been postponed until Sept. 9. The directors recommend that they be authorized to obtain a federal loan of \$200,000. The financial statement shows a loss of \$47,349 for the year compared with \$62,841 the previous year.

The **Royal Typewriter Company** shortened the annual vacation from two weeks to one in order to keep abreast of its orders. The **Underwood-Elliott-Fisher Company** is also in receipt of heavy orders for typewriters.

BRISTOL—When the outing of the officials and employees of the **United Aircraft Corporation** was held here last month, the **Chamber of Commerce** presented two clocks, one made by the **Ingraham Clock Company** and the other by the **Sessions Clock Company**. The presentation was in recognition of the use by the company of springs made by the **Wallace Barnes Company**, brass made by the **Bristol Brass Company** and bearings made at the **New Departure plant**.

The **New Departure Company** is erecting a small addition to Plant 26, estimated to cost about \$15,000.

SOUTHINGTON—**Peck, Stow & Wilcox Company** sales in July were double the total for the same month last year, **President M. J. Lacey** states. For the year ending June 30 the company had a deficit of \$43,200 compared with a deficit of \$87,081 the previous year. Current assets are \$546,426 and current liabilities, \$172,348.

The **Southington Hardware Company** last month paid the regular quarterly dividend of 25 cents a share. **President James H. Pratt** and associate officers and directors were reelected.

NEW BRITAIN—The state board of mediation and arbitration has been negotiating between the officials and the employees of the **North & Judd Manufacturing Company** relative to wages. It is unofficially reported that a 5 per cent wage increase may be put into effect.

MERIDEN — **George H. Wilcox**, chairman of the board of the **International Silver Company** celebrated the 60th anniversary of his connection with the company last month. He is 79 years of age.

WINSTED—The **Hudson Wire Company** is now producing electric coils to be used in power units for model airplanes.

THOMASTON—The original **Seth Thomas** factory building is being torn

down but the first part of that building, erected in 1813, will be preserved for a museum to house exhibits of clocks and machinery. One of the employees has worked continuously in the old shop for 47 years and many have worked there 25 years.—W. R. B.

Providence, R. I.

September 3, 1935.

Rhode Island statistics covering industrial activities during July were released a few days ago by the Brown Bureau of Business Research. These statistics, which include payroll disbursements, power consumed and other activities, indicate that the month of July was a period of seasonal decline from June but, at the same time, was a period of definitely higher industrial activity, considering industry as a whole, than July, 1934.

Total payrolls in the State during July aggregated \$11,535,289. In June, this year, the total was \$12,355,078 but in July last year the aggregate was only \$10,757,098. Of the total payroll disbursements the aggregate for July of the non-ferrous metal industries was \$167,164 which was an increase of 12.1 per cent over the preceding month and 36 per cent better than July last year. The total payroll disbursements for the jewelry and silverware industry in July was \$688,502. This was a falling off of 6.9 per cent from the preceding month but 13.7 per cent advance over July, 1934.

The non-ferrous metal industries are among the few, however, that have been recording the most encouraging recent progress in view of the fact that these lines were harder hit by the depression, perhaps than any other local industry. It is interesting to note that the non-ferrous metal payroll statistics for July total this year the largest of any month since April, 1931. The payroll gains have not been spectacular, but they have been encouraging as revealing improved activity in a sorely depressed industry.

The Narragansett Products Corporation of Providence, has been incorporated under the laws of Rhode Island for the fabricating of metals, with an authorized capital consisting of 100 shares of common stock of no par value. The incorporators are: Thomas F. Black, Harry F. Cross and Harvey S. Reynolds.

The Reliable Electro-Plating Company, of Providence has been given judgment for \$115.02 with costs in Sixth District Court on a disputed book account, against The Emblem Supply Company, Providence.

The Abrasive Machine Tool Company of East Providence, is among the group of American machine tool builders which will supply machine tools to Russia through orders placed by the Amtorg Trading Corporation. The East Providence concern will send grinding machines to the Soviet Union. Machines to the value of three millions of dollars are reported to have been ordered already of various concerns by the Trading Corporation.

Correction

The item in this column in the August issue of **Metal Industry** relative to the award of contracts for supplies for the city of Pawtucket instead of referring to "lead" pipes should have read: "to the United States Pipe and Foundry Company, Boston, for 3,600 feet of six-

inch Class C cast iron pipe, \$45.50 a ton and the Grinnell Company, Providence, 3,000 feet of one-inch galvanized pipe at 34 cents per foot and 200 feet of two-inch galvanized pipe at 76 cents per foot."—W. H. M.

Middle Atlantic States

Trenton, N. J.

September 3, 1935.

Trenton metal manufacturers report that business has shown some increase during the past month. The Westinghouse Electric and Manufacturing Company, has announced an adjustment in wages which will bring about an increase of about five per cent. Some 25,000 employees in 14 plants throughout the country will benefit. Albert Riley, manager of the company's plant at Trenton, said that about 420 employees here would also share the benefit.

The Metal Tone Manufacturing Company, of Jersey City, has been ordered by Vice Chancellor Henry B. Hayes to show by what right it makes those devices that cause baby dolls to cry and say "Mah-Ma." The jurist issued the order after Voices, Inc., a Delaware concern, charged the Jersey City company had used "ingenious methods of avoiding payment of royalties" in manufacturing the contraptions. The complaining company recited that in 1932 it "licensed the Jersey City company to make the devices and leased it the necessary tools and dies," but because of the alleged "ingenious methods" it had to keep "constantly on the watch" to prevent infringement. The complainants asked that the defendant company be restrained from manufacturing the articles during the next 18 years.

—C. A. L.

Newark, N. J.

September 3, 1935.

With thousands already working on day and night shifts, radio tube manufacturers here are planning to further increase their forces to handle orders for the new all-metal radio tubes. The RCA-Radiotron plant at Harrison has continued to add from 50 to 100 hands daily to the payrolls and the force now numbers over 5,000. At the office of the Tung-Sol Radio Tube Company, Newark, it was said that the firm had increased its force by 2,000 during the past few weeks, to handle all-metal tube production.

The former plant of the Electric Storage Battery Company, on Avenue L, Newark, comprising 65,000 square feet, has been sold to the American Can Company. It will be the third plant in Newark for the can company. The former plant of the Splittorf Electric Company, on Warren Street has been sold to the Prudential Insurance Company. The Chron-Art Electric Manufacturing Company, has leased a factory at 63 Hoyt Street for manufacturing purposes.

The strike of the employees of the Eastern Tool and Manufacturing Company, Bloomfield, has been settled and the men returned to work. The trouble started over an increase in working hours at the old wages.—C. A. L.

Middle Western States

Detroit, Mich.

September 3, 1935.

Preparations are under way for an early resumption of business and manufacturing in this area. This is particularly true concerning the motor car industry where preliminary work is in progress for a start on the new models.

The mind of every one seems to be centered on the automobile, with the feeling that production in this line will be underway many weeks earlier than in other years. Everything seems to indicate this is the procedure and will be the means of leveling out the sharp fluctuations that has caused so much distress where employment has ended suddenly at a period of the year where it is most needed.

Excellent reports continue to come from the refrigeration industry. All the plants are active and many of them have had the best summer production

of their existence. Indications are that further progress is in store for them.

The Bohn Aluminum and Brass Corporation, is about to erect an addition to its Plant 8 in Detroit. L. W. Buckheit is in charge of the plans.

Figures announced by the Ford Motor Company show that during the first six months of the year 634,961 units were sold in the United States. This is nearly two-thirds of the 1,000,000 cars and trucks which Ford is building this year.

Murray Corporation of America, body manufacturers, Detroit, is reported operating 60 per cent of peak for the year and probably will hold this level for some time. From present indications Murray will retain Ford as its principal customer for which it now makes a three and five-window coupe, convertible coupe, roadster, phaeton, station wagon and also convertible sedan bodies.

General Motors Corporation announces that \$50,000,000 has been set aside for plant modernization. This apparently expresses the opinion that better times are ahead for the heavy industries. It follows the action of the **Ford Motor Company** in putting \$20,000,000 into betterment of its plant facilities, work on which is expected to be completed by next Spring. In addition the **Chrysler Corporation** recently set aside an additional \$7,000,000 for plant and machinery improvement.

O. B. Mueller, president of the **Mueller Brass Company**, at Port Huron, according to announcement, has decided to dissolve his interests and retire from active business. Mr. Mueller organized the company 43 years ago.

The **Stinson Aircraft Corporation**, division of **Aviation Manufacturing Corporation**, at Wayne, Mich., is now operating at near capacity with 500 men working two shifts a day on two assembly lines, turning out the company's new tri-motored eight-passenger transport and single motor four-place airplanes.

Employment and production at the **Norge** division of the **Borg-Warner Corporation**, Muskegon Heights, now exceeds by more than 50 per cent the scale of operations for this time of the year, it is stated. Nearly 1,900 persons are on the payroll.

An industrial expansion program now underway at the McGraw Avenue plant of the **Kelsey-Hayes Wheel Company**, Detroit, calls for an expenditure of upwards of \$1,000,000, principally for the erection and equipment of a modern foundry. There will be two complete sets of sand and mold handling equipment, one for grey iron brake drums and the other for copper silicon steel drums. This new structure, considered the most modern of its type to be erected in the country during the last five years, will provide the Detroit concern with facilities for manufacturing a line of products for use in the new 1936-model automobiles.—F. J. H.

Chicago, Ill.

September 3, 1935.

The Autumn upturn in business started much earlier than usual this year, at least in Chicago, and it is now well under way.

Manufacturers of radios and electric appliances are for the most part working at almost full capacity. Many plant enlargements are planned for the next six weeks. Some concerns report the largest number of Fall orders since 1930. Many foundries are working night shifts, and even manufacturing jewelers are looking forward to an increase in advance Christmas orders.

One of the most notable sales advances of the year has been scored by the counter freezer industry. Four of the largest manufacturers in the country, as well as the **National Association of Counter Freezer Manufacturers**, are located in Chicago. Some manufacturers

report 1935 Summer sales were 70 per cent ahead of last Summer, while for the year as a whole the increase is 20 per cent over the previous year. To date, 1,050 freezers have been sold throughout the country, according to reports to the national association.

The **International Harvester Company** will spend one million dollars at its Fort Wayne plant in enlargement and improvement of the truck factories there. The plant has been operating at capacity, and three new buildings will be added to take care of additional business.

The **Howard Radio Company** has been enjoying a greatly increased export business following the recent launching of an extensive export advertising campaign.

The **Sentinel Radio Corporation**,

makers of radios for farm use, is preparing to meet the big increase in orders this Winter which is indicated at present.

Benjamin Electric Company of Des Plaines, makers of reflectors and commercial and industrial lighting equipment, have had a substantial increase in orders over this period of last year.

The **Wheeling Steel Corporation** is pushing the suitability of Ductillite tin plated cans as a serving vessel as well as a beverage container.

A number of electric refrigerator manufacturers have cooperated in the establishment of one of the first electrical refrigeration bureaus in the country at Sheboygan, Wis. An electric Summer cooking school has recently been held in connection with the bureau.—R. G. K.

Pacific States

Los Angeles, Calif.

September 3, 1935.

There are several lines, that are new, that soon will get to going on a big business basis. One of these is the building of steel houses, which will be later a billion dollar line. It will be of great benefit to the various metal working concerns, in the way of steel, copper, aluminum, chromium, brass and bronze. This line is just starting and the main idea for such building, is to stop three quarters of the losses from earthquakes, tornados, cyclones, floods and termites. The concerns here starting in it are as follows:—The **Unitype Company**, of 412 West 6th St.; **Palmer Steel Houses** of North Larchmont; **Hanson** of 717 East Gage Ave.; **Wm. C. Lea** of 600 South Clarence St.; **Emsco Derrick & Equipment Company** of 6811 South Alameda St.; **Consolidated Steel Company**; **Columbia Steel Company**; **E. M. Lurie**, all of Los Angeles and the **Latis Steel Houses** of Pasadena. Some of these who will take up this line in the middle west are: **Republic Steel Company** of Cleveland; **The Metal Lath Manufacturing Company** and **Berger Manufacturing Company**, both of Canton, Ohio; also added to that list is the **Interlocking Steel Construction Company** of 680 Santa Fe Ave. of Los Angeles. The cost of these steel houses is 10 to 15 per cent more than wood.

The Pacific Coast is now the largest airplane manufacturing center in the country, there are eight large concerns, six in the Los Angeles area, one at Seattle and one at San Diego. The **Consolidated Aircraft Company** are building a million dollar plant at San Diego and the **Boeing Company** have a large plant at Seattle. **Major H. H. Fleet** is president of the **Consolidated Company**.

Now another big plant comes to the Los Angeles Municipal airport, **North American Aviation**, which has been organized by the **General Motors Corporation**. This plant will cost \$500,000, have 150,000 square feet of floor space

and built of steel throughout. **J. H. Kindelberger** is president and general manager; **J. Leland Atwood**, vice president and **E. R. Doak**, factory manager. They have now contracts for \$1,200,000 worth of planes for the Government.

Another absolutely new line which is just starting is the use of Diesel engines in pleasure automobiles. They have been used, with great success for trucks, tractors, etc. Now the **Cummins Diesel Engine Company** here at 9th St. and Santa Fe Ave. announce that Mr. Cummins has put it in his auto and traveled across the country and several are being used and one in a racing auto. Previously the engine has been too heavy for automobiles, but now the weight is down somewhat. The factory is at Columbus, Ind. The **Hercules** and the **Buda** companies are also experimenting on a light Diesel. It is reported that the **Packard Company** at Detroit and the **Ford Company** are working on a Diesel for their cars. Diesel motor oil in California costs five to six cents a gallon.

The **Fano Flame Burner Company** of Huntington Park, are in full production.

The **Rabun Bronze Foundry** of Huntington Park, are now making mostly bronze and aluminum badges, medals and fancy articles.

The **National Percolator Company** are making a new type of water filter.

The **Magnus Company** are building here in the Bandini section, the largest non-ferrous brass foundry in the west, to have a capacity of 1,000,000 pounds of brass castings a month. It will contain 42,000 square feet of space and three times larger than the present plant. They will employ a total of 125 men at the brass work. This plant will cost \$150,000. **F. R. Nagel** is resident manager, **Fred K. Czerniski**, general factory manager and **S. J. Sill**, mechanical engineer.

The **Herberth Horn Radio Manufacturing Company** of 1201 South Olive St. are making another big enlargement of their factory, to increase production from 100 to 300 radios a day.—H. S.

★ THE NEW H-VW-M ★

MERCIL TYPE

BURNISHING BARREL

A SELF contained unit, motor driven, easy to load, easy to operate, at any angle and requiring a minimum of floor space—that's the story of the newest addition to the Hanson-Van Winkle-Munning line of plating and finishing equipment and supplies.

This barrel not only saves time—it puts burnishing on a production basis. You can predetermine the exact results and maintain the same quality and quantity of work day after day.

And it's built to Hanson-Van Winkle-Munning Standards. Structural steel and boiler plate, all metal, all welded frame and protected with alkali resistant paint, this barrel will stand up under the heaviest type of service for years. It is made in two sizes and several of these units have been in service for more than a year.

It has many safety features, saves in in-

stallation cost and its mechanical features are perfected to the last detail.

Complete specifications, description and photographs will be furnished on request.



★ SPECIFICATIONS ★

Inside	No. 1 Size	No. 2 Size
Dimensions	11 $\frac{3}{8}$ " Octagonal	14 $\frac{1}{4}$ " Octagonal
(after lining)	24" Deep	30" Deep
Floor Space	26 $\frac{1}{2}$ " x 48"	31 $\frac{1}{2}$ " x 56"
Loading Height	44 $\frac{1}{2}$ "	51"
Net Weight	530 lbs.	915 lbs.
Motor	$\frac{1}{2}$ H. P.	$\frac{3}{4}$ H. P.

All non-friction bearings.
Cylinder speed about 60 r. p. m.
Cover self aligning.
Timken roller bearings.
Motor switch—Thermal overload protection.
End grain hardwood block lining.
Removable wearing plate in bottom of barrel.

HANSON-VAN WINKLE-MUNNING

HANSON-VAN WINKLE-MUNNING COMPANY, MATAWAN, N. J.

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October, 1935

METAL INDUSTRY

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